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## THE FREE INTERVAL IN MENINGEAL HEMORRHAGE[1]


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CASE I. *Trauma, slight concussion; exact length of free interval unknown. Retired for night, apparently well, five hours after accident. Found dead in the morning. Autopsy revealed a fissure fracture of the parietal bone, lambdoid, and occipitomastoid sutures, along the groove for the lateral sinus to the foramen lacerum posticus. No depression, but a large extradural clot.*

Mr. S., aged 38, American, a freight-brakeman, while engaged in tightening a brake on a box-car, slipped and fell to the track. He alighted upon his head and shoulder, but arose immediately; he was somewhat stunned, and sat down. After the lapse of about ten minutes, he felt better and wanted to resume his work, but this the conductor would not allow him to do. He was advised to consult a doctor, but instead of doing so, went to his boarding-house.

The accident occurred at three P. M., and the victim retired about eight P. M., feeling fairly well, having merely a slight headache. At about ten o'clock in the evening a friend went to the door of his room and knocked, but, receiving no answer, took it for granted that the occupant was asleep, and went away. In the morning the brakeman was found dead in bed.

Autopsy, in the presence of Drs. Jeannotte, Boyd, and McDonald of Leadville, November 28, 1902, revealed the following: Scalp intact, a depression an eighth of an inch deep, three inches long, and half an inch wide was to be seen in the right occipitoparietal region, which extended from an inch posterior to the mastoid process, upward and toward the median line. This area was dark at the center, and presented the appearance of having come into forcible contact with a blunt object.

Upon dissecting back the scalp, a large amount of extravasated blood was found in the region underlying the depression of the skin. This area of ecchymosis in the subcutaneous tissue was about four inches in diameter.

A linear fracture was found to extend from below the mastoid process in an upward direction for about four inches, three inches of which being in the occipitomastoid and the lambdoid sutures and the last inch in the parietal bone, extending forward and toward the center of the vortex. There was absolutely no depression.

Upon removing the calvarium, an extradural clot was found, 3 by 3 inches by 1 inch, located in the right occipitoparietal region. (See Figs. 1, 2, and colored plate.) This clot was bounded anteriorly and externally by the posterior surface of the petrous portion of the temporal bone and the tentorium cerebelli; posteriorly and externally, by the parietal and occipital bones; and internally by the dura mater.

After removing the clot, the line of fracture could be seen to extend along the groove for the lateral sinus to the foramen lacerum posticus. The lateral sinus was torn. The dura was intact; the cerebrum and cerebellum appeared normal.

CASE II. *Trauma, concussion five minutes, free interval two hours. Irritability, restlessness, paralysis of right arm, and increasing somnolence. Operation three hours after accident. Y-shaped fracture of parietal bone with depression, extending toward the base. Extradural clot, from posterior branch of middle meningeal. Elevation of depression, removal of blood, gauze packing, recovery.*

C. H., aged 28, American, laborer. Fell from a scaffold about ten feet high, alighted upon head. Was unconscious for about five minutes, then arose and walked. Complained of severe pain in the head.

Patient was taken to St. Vincent's Hospital, where his sole complaint was headache, with tenderness over left parietal eminence.

Examination one hour after accident revealed on focal or general pressure symptoms. Over the left parietal eminence there was a diffused doughy swelling,

[1] Read before the Western Surgical and Gynecological Association, at Kansas City, Missouri, December 28, 29, 1905.

about two and a half inches in diameter. Pressure or percussion over this area caused severe pain.

The patient was put to bed with an ice-cap to head and given magnesium sulphate one ounce. During the first hour he was quite restless, continually tossed about, and complained of headache. The motion of extremities was the same on both sides, and he seemed perfectly rational.

At the beginning of the second hour in hospital, third after the accident, the nurse, who had been instructed to watch him very carefully, noted that he moved the left arm more than he did the right.

During the second hour he became more quiet, and sank into a deep, apparently normal, sleep, from which he could be aroused only with difficulty. At this time I again saw the patient, and there was a distinct paralysis of the right arm; the reflexes were present and an uninterrupted recovery. The bleeding was evidently from the posterior branch of the middle meningeal artery.

Case 2 is typical and quite usual. Case 1, on the other hand, while not very rare, is still rather uncommon. In eighty cases studied by the writer, only two similar instances were encountered.

The discrepancy in the length of the latent period in these two instances, and the tragic result of its presence in one, led to a study of this "free interval," which was based upon cases taken from available literature, the result of which is here appended.

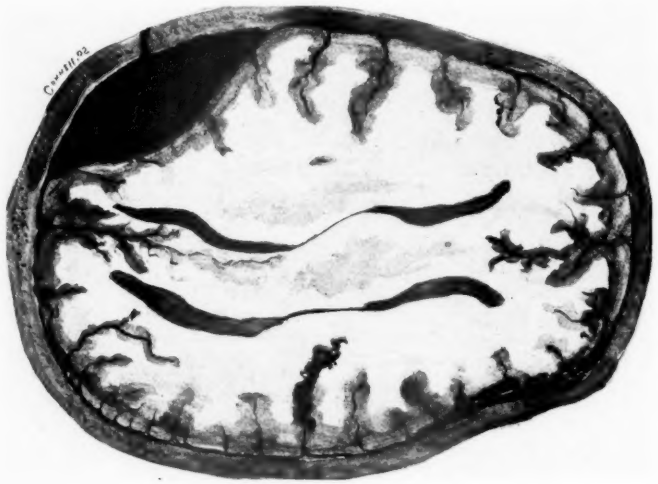

Fig. 1. Specimen from Case 1.

normal; the face and pupils were normal. He could not be fully awakened, and his speech was merely an incoherent mumble.

Operation three hours after the injury. A few whiffs of chloroform were administered by Dr. Gregersen. Dr. Jeannotte assisted. An omega-shaped skin incision was made over the area of swelling and contusion, and revealed a comminuted, Y-shaped fracture of the parietal bone. The fragment forming the apex of the V was depressed. Upon elevating this depression, blood escaped. With rongeur forceps the opening in the skull was enlarged toward the base, following the line of fracture. The blood was removed with blunt instrument and a stream of normal salt solution. The dura was intact and was not incised. The source of the bleeding was not located; the wound was packed with gauze. The paralysis of the arm had disappeared the next day, and the patient made

### DEFINITION

By "free interval" is meant a practically symptomless period of consciousness, which follows a primary transitory unconsciousness, and precedes a secondary increasing and permanent loss of consciousness; this condition being usually found in association with a head injury.

### ETIOLOGY

The cause of the bleeding will, in the vast majority of cases, be traumatism, but may be spontaneous.

Boreau reports a case of hemorrhage following anæsthesia with chloroform, and con-

siders the chloroform as the cause. But, as the operation was performed for a sarcoma of the forehead, it is possible that the pathological condition, or the trauma of the operation, might have been more of a causative factor than the anæsthesia. The patient recovered in this instance; so the exact condition was not known.

Whooping-cough may serve as a cause, which might be classed as indirectly traumatic. Townsend collected twelve cases due to this cause, and the literature has been added to by Brown and by Loevy.

The traumatism of delivery has frequently been found to cause meningeal hemorrhage. Numerous cases with no fracture have been reported. In 78 cases reviewed in this study, 46 were complicated by fracture, and in 32 cases there was no fracture of the skull.

Intracranial hemorrhage may be divided into: A. Meningeal; and B. Cerebral.

Cerebral hemorrhage, when traumatic, is practically always associated with contusion and laceration of the brain, and only exceptionally is there a free interval.

Meningeal hemorrhage may be divided into: 1. Extradural; and 2. Subdural.

1. In extradural hemorrhage, the blood is situated between the dura and the skull; it

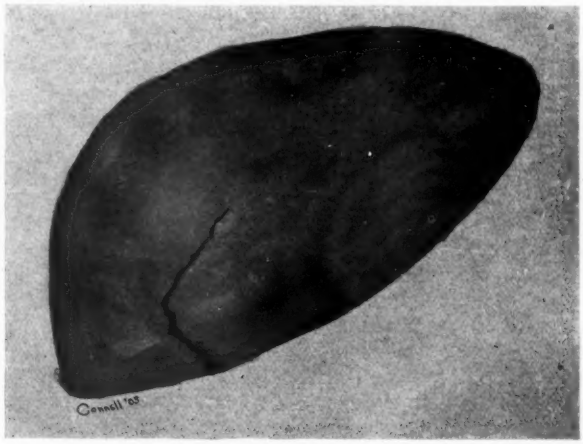

Fig. 2. Calvarium from Case 1.

Richardière and many others have noted this, and in 1901 Wilson considered the subject of intracranial hemorrhage in the new-born at length, but under treatment did not mention surgical intervention. W. W. Keen criticised this omission, and stated that at the very first opportunity he intended to operate and remove the clot, the cause of the pressure in these cases; he and Dr. S. Weir Mitchell having had the advisability of such an operation under consideration for some time.

In 1905, Cushing reports a number of cases of this character in which he had operated.

With direct traumatism there is usually a fracture of the skull, but fracture is by no means a constant accompaniment of meningeal hemorrhage. Numerous cases with no fracture have been reported. In 78 cases reviewed in this study, 46 were complicated by fracture, and in 32 cases there was no fracture of the skull.

Intracranial hemorrhage may be divided into: A. Meningeal; and B. Cerebral.

Cerebral hemorrhage, when traumatic, is practically always associated with contusion and laceration of the brain, and only exceptionally is there a free interval.

Meningeal hemorrhage may be divided into: 1. Extradural; and 2. Subdural.

1. In extradural hemorrhage, the blood is situated between the dura and the skull; it arises from the middle meningeal artery, the dural sinuses, or, rarely, from the diploic vessels.

2. In subdural hemorrhage, the hæmatoma is located between the dura and the brain. With a tear in the dura, it may be continuous with an extradural clot. With an intact membrane, it may arise from the meningeal artery, the sinuses, the pial vessels, or from a hemorrhagic pachymeningitis.

Subdural accumulations of blood may occur independently of bleeding from the meninges, as in cases of laceration of the brain, in which the terminal branches of the middle cerebral are the source.

The frequency with which intracranial hem-

orrhage complicates head injuries may be seen from the statistics of Phelps, who found, in 193 autopsies, hemorrhage in 181 cases; extradural, 54 times; subdural, 69 times; and cerebral, 58 times. He states that in from fifty to sixty per cent of cases, hemorrhage becomes an important element, and in an eighth of all cases it is the direct cause of death.

As to the cause of the free interval itself, there have been presented numerous explanations. The more common and generally accepted reasons offered for the occurrence of this latent period are such as:

1. The time in which the dura is being separated from the skull. Sir Charles Bell, in 1816, found that the dura was intimately attached to the inner surface of the skull, and that a blow or a fracture caused a separation of these structures, in this way forming a space in which the blood could accumulate, and as this mass of blood increased in size, its force became greater, and more dura was detached. In this manner large clots were formed, and finally pressure symptoms appeared.

On the other hand, most anatomists, notably Marchand and Tillaux, found the dura loosely attached to the inner surface of the skull, except at the sutures, the foramina, and the tentorium. In the temporal region Marchand describes the dura as being easily separable, and has called this area the " zona decollable," meaning the zone of separation. In infants the dura is much more intimately adherent to the skull, hence the comparative infrequency of extradural clots in meningeal hemorrhage of the new-born.

In accordance with this theory, there is a high arterial pressure in the middle meningeal artery, with an injury of that vessel; a much lower intracranial tension, compressibility of the cranial contents, and a separable dura. These are the elements necessary for the formation of an extradural clot, and while the clot is forming, we have the free interval.

As showing that there may be a free interval under circumstances dissimilar to the above, the case of Da Costa is instructive. Incision revealed a fracture, with hemorrhage from the sinus; bleeding was controlled by gauze packing, and the patient did nicely for a number of days, but on the tenth became violently insane. A piece of gauze twelve inches long, which had been overlooked in the dressings, was then removed, and the patient made an uneventful recovery.

Definite free interval in cases of head injury, and in which there is no hemorrhage, but concussion and laceration of the brain tissue, are not uncommon.

2. Another explanation may lie in the fact that immediately and soon after the injury the artery will not bleed rapidly, on account of the lowered arterial tension, due to concussion of the brain and the shock of the injury.

3. Again, after bleeding has been started, noticeable pressure will be exerted sooner if a large vessel is divided, than if a smaller branch is the source of the hemorrhage.

4. The length of the interval will depend, upon the size, as well as upon the situation, of the clot. A large clot at the vault or over a silent area may give rise to no symptoms; a smaller one at the base or over the motor area of the brain, owing to the adjacent important structures, may cause very marked manifestations of its presence.

5. Another cause of delay in the onset of pressure symptoms is the possible escape of blood through a fracture of the skull, into the subaponeurotic space.

6. Hutchinson considers the termination of the free interval to be due to a secondary hemorrhage, which may come on after a varying length of time, and may be caused by unusual exertion, coughing, straining, great mental excitement, or suppuration. Towers reports a case in which such an explanation seems quite rational.

Phelps, Crile, Cannon, Cushing, Hill, Bergmann, and many others, have made extensive observations and experiments in an effort to determine the exact nature of these secondary changes occurring after head injuries; but Kocher's explanation and classification of the steps in the process are undoubtedly the best and the most generally accepted at the present time. He divides the change into the following stages: 1. Compensationsstadium; 2. Anfangsstadium des manifestaten Hirndrucke; 3. Hohesstadium des manifestaten Hirndrucke ; 4. Lahmungsstadium; and explains the free interval as follows:

7. As a result of the hemorrhage, there is an accumulation of blood within the cranium, and hence an increased intracranial tension, which at first produces compression of veins and lymphatics. The obstructed venous return increases the blood-pressure in the arteries, and the circulation continues as usual. The cells are supplied with sufficient nourishment, and they functionate in a normal manner.

This is the stage of " compensation " of Kocher, and corresponds to the free interval. Headache, caused by pressure on the dura, is, as a rule, the only symptom noticed. With a loss of this compensation, there is a lack of nutrition, and, in turn, an interference with function; pressure or localizing symptoms develop, and the free interval is terminated.

### DURATION

The duration of the free interval is of great practical importance. A knowledge that the danger of compression can be eliminated in a given case will be a prime factor in the prognosis. The interval may be absent altogether, or it may be of unusual length. But, if for more than a few days, it is usually suspected, or is at least open to the suspicion that the pressure symptoms are due to some complication other than simple bleeding. As given by the following authors, a great diversity will be seen:

Jacobson: from 1 hour to 10 days.
Wiesman: from 15 minutes to 4 days.
Holmes: from ½ to 4 hours.
Treves: from 2 to 3 days.
Brandon: seldom beyond 1½ hours.
Vaughan: occasionally as much as a week.
Tillmanns: from 4 to 12 hours.
Keen: from 2 or 3 hours, up to a day or two.
Kiliani: from a few hours to 3 or 4 days.
Scudder: from a few moments to three months.

From available literature, and including the two cases reported herewith, I have collected 80 cases of meningeal hemorrhage.

The shortest interval mentioned was " a few minutes"; the longest was 6 weeks (Keen), and from 6 to 8 weeks (Kammerer). The average length of this latent period in these 80 cases is 67.6 hours.

Excluding the two cases of exceptional length, the next longest interval will be 17 days, of which there is only one; considering this, also, as unusual, the longest interval remaining will be 10 days, of which there are two instances.

After eliminating these three cases of unusual length, and taking the ten-day interval as an extreme, the average length of the 77 cases will be 26.3 hours.

In 19 of the 80 cases there was no free interval. Subtracting these from the 77, the average interval of the remaining 58 cases will be 35 hours.

In order to arrive at a better understanding of the frequency with which these different intervals occur, the following summary is presented:

| | | | | |
|---|---|---|---|---|
| No free interval | | | | 19 |
| Under 1 hour | | | | 5 |
| Between | 2 | and | 5 hours | 14 |
| Between | 5 | and | 10 hours | 2 |
| Between | 10 | and | 20 hours | 5 |
| Between | 20 | and | 30 hours | 4 |
| Between | 30 | and | 40 hours | 2 |
| Between | 40 | and | 50 hours | 6 |
| Between | 50 | and | 60 hours | 1 |
| Between | 60 | and | 70 hours | 1 |
| Between | 70 | and | 80 hours | 1 |
| Between | 80 | and | 90 hours | 0 |
| Between | 90 | and | 100 hours | 3 |
| Between | 100 | and | 200 hours | 6 |
| Between | 200 | and | 300 hours | 2 |
| Between | 300 | and | 400 hours | 0 |
| Between | 400 | and | 500 hours | 1 |
| Between | 500 | and | 1000 hours | 0 |
| Between | 1000 | and | 2500 hours | 2 |

Distinct free interval was noted four times, in which there was demonstrated to be no hemorrhage within the cranial cavity. (As these are not cases of meningeal hemorrhage, they were not included in the above statistics.)

### VARIATIONS

The typical train of events in a meningeal hemorrhage is:

1. Trauma.
2. Concussion (unconsciousness).
3. Consciousness (free interval).
4. Compression (unconsciousness).

But this may be variously modified. Trauma may be absent; and with trauma absent, con-

cussion will not be distinct. Concussion may be absent, with slight traumatism; but even in very severe injury there may be no evidence of concussion, as is seen in the case of Scudder, in which there was a compound depressed fracture of the vault, with escape of brain substance and hemiplegia, yet there were no symptoms of concussion of the brain.

In my group of cases, concussion was mentioned in the histories 61 times; it was present in 47 instances and absent in 14.

The free interval may be missing, and was found to be absent in 19 of 80 cases. In 4 of these there was neither trauma nor concussion from which to date the interval, but in the other 15 the interval was absent because of severe injury, in which the concussion lasted until the compression became effective.

Compression may not manifest itself when the clot is small and over a silent area of the brain; absorption may take place, the patient recover, and the hemorrhage be unsuspected until discovered at an operation or autopsy.

The evidence of compression is shown by localizing and by general pressure symptoms, which usually accompany each other; but they may be separate and distinct. In depressed fracture of the skull, followed by hemorrhage, the symptoms usually appear at once, and, after a period corresponding to the free interval, increase in severity. In a case reported by Brandon, localizing symptoms appeared 10 or 11 hours after the accident, but general pressure symptoms did not present themselves for a number of days.

### DIAGNOSIS

In arriving at a diagnosis of meningeal hemorrhage, one must consider the variety of the hemorrhage, and differentiate it from confusing conditions.

With a free interval there is, as a rule, meningeal hemorrhage; cerebral hemorrhage may be excluded. The non-traumatic meningeal hemorrhage, with no free interval, may be confused with ingravescent apoplexy.

The differentiation into extra and intra dural, or epi and sub dural has been attempted upon the length of the interval. Jacobson, after a study of 68 cases, says that the long interval is more likely to occur in extradural bleeding, and M. Allen Starr corroborates this opinion. On the other hand, Laclerc, Kiliani and Brion look upon a long free interval as significant of an intradural clot.

In the cases collected by the writer, there were 76 in which the variety of the hemorrhage was mentioned: Extradural, 48; intradural, 18; both, 10.

In the extradural, the longest interval was 6 weeks; the shortest, a few minutes; and the average 48.4 hours. Excluding the unusual case, the longest interval was 10 days, and the average of the 47 cases, 27.6 hours. Deducting those 11 cases in which there was no free interval leaves 36, and the average length of these is 36.3 hours.

In the cases of extradural hemorrhage, the interval was:

| | |
|---|---|
| Not present | 11 |
| Under 1 hour | 6 |
| Between 1 and 5 hours | 11 |
| Between 5 and 10 hours | 3 |
| Between 10 and 20 hours | 3 |
| Between 20 and 30 hours | 2 |
| Between 30 and 40 hours | 2 |
| Between 40 and 50 hours | 1 |
| Between 50 and 60 hours | 1 |
| Between 60 and 70 hours | 0 |
| Between 70 and 80 hours | 3 |
| Between 80 and 90 hours | 0 |
| Between 90 and 100 hours | 1 |
| Between 100 and 200 hours | 2 |
| Between 200 and 300 hours | 1 |
| 1008 hours | 1 |

With the intradural bleeding, the longest interval was 7 weeks; the next, 3 weeks; the shortest, half an hour; with an average of 143.3 hours.

Deducting the two unusually long intervals, the extreme will then be 10 days, and the average of the remaining 16 cases will be 56 hours.

If the 3 instances in which there was no free interval be not included, the average of the resultant 13 cases will be 69.2 hours.

In these cases the interval was:

| | |
|---|---|
| Not present | 3 |
| Under 1 hour | 0 |
| Between 1 and 5 hours | 0 |
| Between 5 and 10 hours | 0 |
| Between 10 and 20 hours | 1 |

| | |
|---|---|
| Between 20 and 30 hours | 1 |
| Between 30 and 40 hours | 0 |
| Between 40 and 50 hours | 2 |
| Between 50 and 60 hours | 1 |
| Between 60 and 70 hours | 1 |
| Between 70 and 80 hours | 1 |
| Between 80 and 90 hours | 0 |
| Between 90 and 100 hours | 2 |
| Between 100 and 200 hours | 3 |
| Between 200 and 300 hours | 1 |
| 504 hours | 1 |
| 1176 hours | 1 |

Where both an intra and an extra dural clot was found there was always, in addition, laceration and contusion of the brain.

In these cases the longest interval was 72 hours; the shortest, half an hour; and the average, 32.1 hours.

Deducting the 3 cases in which there was no free interval, the average of the remaining 7 was 45.9 hours.

In this class of cases the interval was:

| | |
|---|---|
| Not present | 3 |
| Under 1 hour | 1 |
| Between 1 and 5 hours | 1 |
| Between 40 and 50 hours | 3 |
| Between 70 and 80 hours | 2 |

From this analysis we find that the long free interval accompanies intradural hemorrhage, but it would seem that much stress cannot be placed upon the length of the free interval as a guide to the location and the variety of the hemorrhage.

From a theoretical point of view, it would seem that in intradural bleeding, which is frequently associated with injury to the cortex, symptoms of pressure and disturbance of brain function would occur sooner than if the pathological condition was separated from the brain by the thick and tense dura.

Other variations in the signs and symptoms may, or may not, serve as indications as to this point, but, as a general proposition, it may be stated that extra and intra dural hemorrhage cannot be differentiated with any degree of accuracy. Fortunately, this is not always necessary, as the treatment is the same with the accumulation of blood in either locality. The pressure must be removed, and if it is not found above the dura, that membrane must be incised, and the clot looked for beneath it.

Hemorrhage from the diploic vessels rarely, if ever, causes symptoms.

Hemorrhage from the dural sinuses is similar to that from the meningeal artery, with the exception that it is slower, on account of the lowered arterial tension. Wharton has collected 70 cases of hemorrhage from the dural sinuses, of which 40 were from the superior longitudinal, 25 from the lateral, and the remainder from the others. Death occurred in 65 per cent of these cases; 26 times with intradural clot, 11 with extradural, and 7 died from external hemorrhage.

In the cases of intracranial hemorrhage collected by Chipault, the bleeding was from the artery 72 times, and from the venous sinuses 30 times. In 80 cases collected by the writer, only 5 were from the sinuses, 3 from the lateral, and 2 from the longitudinal.

Hemorrhagic pachymeningitis, so well considered by Bullard and by Munro, offers an enticing, but as yet rather obscure, field for diagnostic acumen. Fortunately, again, the treatment in these conditions is practically the same as for bleeding.

The site of the injury and the source of the hemorrhage may not coincide and may be very distant. Fracture or injury at one side of the head and bleeding from the vessels of the opposite side is not a very uncommon occurrence. Such an instance is reported by Phelps, and Bergmann, in 99 cases, found 3 in which the hemorrhage was on the side opposite to the fracture. Fracture or injury at one point, and bleeding from a distant point on the same side of the head, also occur. Trauma to one side, and bleeding from the vessels of both sides, must also be called to mind in obscure cases.

When evidence of injury is absent, the diagnosis is, of course, made solely by the focal signs; but when these symptoms of pressure and the evidences of injury do not coincide, the greater stress should be placed upon the localizing symptoms. To quote Bartlett: "A localizing symptom is of far greater value than any external evidence of injury, as an indication of the proper point for the operative attack."

But, on the other hand, the fallibility of these focal signs must be remembered. Hemiplegia

is almost always contralateral; i. e., paralysis of one side, and pressure on the brain on the opposite side, because of the decussation of the fibers at the base of the brain.

Very rarely there occurs collateral hemiplegia; i. e., the paralysis and the pressure upon the same side. Ledderhose collected 48 such cases from the literature. Dawbarn reports a case of this character in which the clot was found, at autopsy, upon the same side as the paralysis. Bryant, in the discussion, mentioned having had a similar experience, and having knowledge of another case.

It has been claimed that such an anomaly did not exist, but was due to faulty observation or interpretation of the symptoms on the part of the observer. But Dawbarn sent the brain with the beginning of the cord of his case to Dr. Gray, who made a careful examination and found that the motor fibers did not cross at the base, but passed down in the cord, each upon its own side. In cases with symptoms warranting an operation, and no clot is found, the opposite side of the brain should always be examined.

In fracture of the base, with lesion of the facial nerve in the Fallopian canal, the face on the side of the fracture and the extremities of the opposite side are paralyzed, thus giving the picture found in "crossed paralysis." Fractures of the limbs may cause confusion in determining the presence or absence of paralysis. Where a previous history cannot be obtained, previously existing paralysis may lead to very aggravating mistakes. Holmes cites a case in which a congenital attachment of the iris led to some uncertainty as to the diagnosis.

### FROM CONFUSING CONDITIONS

Contusion and laceration of the brain, or even simple active hyperæmia, may approach the picture of hemorrhage so closely that they may be confused.

Jopson cites a case with a history typical of hemorrhage, yet, at operation, no hemorrhage was found at either side. The cortical irritation in this instance was probably due to minute hemorrhages or lacerations.

Fairchild notes an instance in which, after an indirect trauma, and a free interval of three days, pressure signs gradually developed and progressed to a fatal termination. At autopsy there was found to be an extensive laceration of the brain.

Similar cases of serious damage to the brain, in which there has been a marked free interval, have been reported by Phelps, by Lemon, and by others.

The finding of blood in the cerebrospinal fluid after lumbar puncture is of rather doubtful value as a diagnostic measure. Tuffier, and Milian, and Widal have made numerous observations upon the cerebrospinal fluid in this class of cases.

Devraigne advocates lumbar puncture, especially in the new-born with cerebral symptoms, and claims for this procedure diagnostic, prognostic, and therapeutic value.

The sphygmomanometer and the hæmocytometer have, as yet, thrown no appreciable light upon the diagnosis.

Abscess of the brain and hemorrhage may at times be differentiated with the greatest difficulty.

Kammerer mentions a case in which there was a free interval of six weeks, and a diagnosis of abscess was made, but at the operation an old blood-clot was found.

In Spencer's case of abscess, there was an interval of only three days, and the symptoms might easily have been confused with those arising from hemorrhage.

As a rule, the longer interval will be found in conjunction with an abscess. Deaver says that pressure symptoms coming on immediately after the injury indicate a depressed fracture; if a short time thereafter, hemorrhage; and if some days after, pus.

Secondary apoplexy has been confused with meningeal hemorrhage by Bollinger. The free interval is usually longer, from 12 to 20 days up to several weeks, but in other respects very closely resembles the condition under consideration.

Krönlein has mistaken an instance of fat embolism for meningeal hemorrhage. In both conditions there is a distinct period of euphria, and in the cerebral variety of fat embolism the differentiation may be extremely difficult.

An absence of fat in the urine in a suspected case may exclude fat embolism, but the pres-

ence of lipuria does not mean that the symptoms are due to fat embolism, as fat in the urine is a frequent accompaniment of fractures of the long bones.

A large amount of fat in the urine would, of course, make one lean toward the diagnosis of embolism. The presence of fat in the sputum would practically confirm the diagnosis. A combination of both conditions might very easily take place.

Holmes recites a case in which fracture with an extradural clot was mistaken for paretic dementia. Thirteen days before death, the patient was found wandering aimlessly about the streets, unable to give an account of himself. He was then delirious for several days, and this was considered a delirium tremens. He was pronounced insane and placed in an asylum. A few days previous to death, the attendant noticed that the patient did not move his left arm. Death took place suddenly, and was supposed to be due to " paretic dementia," but the autopsy revealed fracture of the skull, with a large extradural clot.

Phelps cites a somewhat similar case. In non-traumatic hemorrhage the diagnosis is usually very obscure, and the operation, if performed at all, is generally in the nature of an exploration. Starr mentions such a case, in which he made a doubtful diagnosis of non-traumatic hemorrhage, but at the operation nothing was found to account for the symptoms.

Scudder calls attention to the condition of hysteroid semi-consciousness, and warns against confusing this with the deep unconsciousness of hemorrhage.

### PROGNOSIS

The prognosis is uncertain. Without doubt, cases of meningeal hemorrhage do recover, that is, do not die, under no treatment, or the so-called expectant plan of treatment.

Phelps cites many cases of undoubted meningeal hemorrhage, unverified by autopsy, which were followed by perfect recovery.

Cases that recover perfectly are, of course, lacking in an absolute certainty as to the diagnosis, and the proportion of such perfect recoveries cannot be accurately determined upon. The frequency of evil after-effects of fracture of the skull is so well known that it need merely be mentioned. Cases showing such after-effects of meningeal hemorrhage as to make the patient a chronic invalid are related by Corning, Holmes, Wright, and others.

On the other hand, cases in which a diagnosis of meningeal hemorrhage cannot be questioned, and the patients made satisfactory recoveries, are reported by Walton, Starr, and Fairchild. Fairchild's case was under observation for a long time, and there were no obvious evil sequelæ. But, notwithstanding the recovery in this instance, he advocates operative interference, with the object of removing the pressure.

In the 80 collected cases, recovery took place in 43, and death resulted in 37; 52 were operated upon and 28 were not. After operation, there were 39 recoveries and 13 deaths. Without operative interference, 4 recovered and 24 died.

In the 48 extradural hemorrhages, there were 32 recoveries; 28 with operation and 4 without. Death resulted 16 times; 6 after operation and 10 after no operation.

In the 18 intradural hemorrhages, 9 recovcovered, each after operation, and 9 died—4 subsequent to operation and 5 without operation.

Of the 10 instances in which there were intra and extra dural bleeding, with damage to the brain, 2 recovered, each after operation, and 8 died—1 after operation and 7 with no surgical intervention.

### TREATMENT

There is, of course, no treatment for the free interval; but for the condition that causes the termination of the free interval, the treatment is so important that it must be briefly considered.

The removal of the clot, i. e., the pressure, is the indication to be fulfilled.

Always shave the entire scalp in any case suspected of severe injury to the head.

The skull may be opened at one or more points, but preferably by a plastic resection. If the clot is not found external to the dura, that membrane must be incised; and if not found in either of these locations, the opposite side of the skull must be opened and the cavity explored before the search for the pressure is

given up. The clot may be removed by a scoop, a dull curette, or a stream of normal salt solution. After the removal of the clot, the point of bleeding must be located, if possible, and then ligated. Hemorrhage from the meningeal artery will stop spontaneously much less frequently than will other arteries, because of its close attachment to the dura, which does not allow the vessel to retract, as it will in other locations. The artery should be surrounded by catgut on a full curved needle and ligated.

Jopson mentions a case in which the clot was washed out, but the source of the bleeding was not located nor controlled, and death resulted from subsequent hemorrhage and compression of the brain.

In case the bleeding is from the artery as it passes through the foramen spinosum, ligature may be impossible. Then gauze packing, or plugging the opening with some foreign material, such as wood, ivory, nail, or catgut, must be relied upon.

With hemorrhage from the sinuses, or when the source of the bleeding cannot be located, gauze packing will generally be quite successful.

## BIBLIOGRAPHY


Boureau. Rev. de Chir., July, 1902.
Townsend. Ref. Hand-book Med. Sciences.
Brown. New York Med. Jour., April 25, 1903.
Loevy. Deut. Zeit f. Chir., Nos. 2–4, 1903.
Richardiere. Med. Mod., Paris, 1889–90, vol. i.
Wilson. P. M. J., Feb. 2, 1901.
Keen. P. M. J., Feb. 9, 1901.
Cushing. Am. Jour. Med. Sci., Sept., 1905.
Phelps. Traumatic Injuries of the Brain, 1897.
Bell. Surgical Observations, 1816.
Da Costa. Annals of Surgery, March, 1903.
Hutchinson. Clin. Surgery, vol. ii.
Towers. Lancet, Aug., 1903.
Phelps. N. Y. and P. M. J., June 10, 1905.
Crile. Blood Pressure. 1903.
Cannon. Am. Jour. of Physiology, Oct., 1901.
Cushing. Am. Jour. Med. Sci., Sept., 1902, and June, 1903.
Hill. Phys and Path. of the Cerebral Circulation. 1896.
Bergmann. Deut. Chir., 1880, xxx.
Kocher. Am. Jour. Med. Sci., June, 1903. (Cushing.)
Wiesmann. System of Surgery. Bergmann, Bruns, and Mikulicz, 1904, vol. i.
Holmes. Surgery of the Head, 1903.
Treves. System of Surgery.
Brandon. Dominion Med. Monthly, Jan., 1905.
Vaughan. Am. Jour. Med. Sci., Nov., 1901.
Tillmanns. Text-book of Surgery, vol. ii.
Keen. J. A. M. A., Sept. 7, 1901.
Kiliani. Annals of Surg., March, 1901.
Jacobson. Guy's Hospital Report, vol. xliii, 1886.
Scudder. The Treatment of Fracture. 1904.
Starr. Brain Surgery. 1893.
Laclerc. Rev. de. Med., 1887, vol. vii.
Wharton. Annals of Surgery, March, 1903.
Chipault. Chir. Oper. du Syst. Nerveux, tome i.
Bullard. Trans. Am. Neur. Ass'n, 1895.
Munro. Surg. Treat. of Hemorrhagic Packymeningitis. Boston, 1902.
Bartlett and Schwab. Interstate Med. Jour., Dec., 1903.
Dawbarn. J. A. M. A., Sept. 7, 1901; Annals of Surgery, March, 1901.
Jopson. Annals of Surgery, March, 1903.
Fairchild. J. A. M. A., Sept. 7, 1901.
Lemon. J. A. M. A., July 18, 1903.
Tuffier and Milian. Gazette de Hopitaux, Aug. 22, 1901.
Widal. Presse Medical, Nos. 44, 50, 1903; J. A. M. A., Aug. 22, 1903.
Devraigne. Presse Medical, Aug. 16, 1905; N. Y. and P. M. J., Sept. 9, 1905.
Kammerer. Annals of Surg., March, 1901.
Spencer. American Medicine, Dec. 7, 1901.
Deaver. Surgical Anatomy, vol. ii, 1901.
Corning. N. Y. M. J., Dec. 17, 1904.
Wright. Brooklyn Med. Jour., May, 1905.
Walton. Am. Jour. Med. Sci., 1898.


### ADDITIONAL CASES


Krauss. Am. J. Med. Sci., Sept., 1904.
Toogood. Lancet, Nov. 1, 1902.
Hendon. Kentucky Med. Jour., July, 1905.
Plummer. Annals of Surgery, Oct., 1902.
Manley. Brooklyn Med. Jour., Oct and Nov., 1889.
Horsley. N. Y. M. J., Feb. 9, 1901.
Carpenter. J. A. M. A., Oct. 5, 1901.
Hamilton. American Year-Book, 1902.
Ramsey. Int. Med. Jour. of Australia, Oct. 20, 1900.
Wharton. Annals of Surgery, March, 1903.
Taylor. Annals of Surgery, March, 1903.
McBurney and Starr. Brain, pt. lv, p. 254.
Hotchkiss. Annals of Surgery, July, 1902.
Lathrop. Annals of Surgery, Sept., 1901.
Hamilton. Murphy, Year-Book, 1901.
Ericksen. Text-book of Surgery, vol. i.
Russell and Pinkerton. B. M. J., June 15, 1895.
Hahn. Zeit. f. Chir. No. 6, 1896.

# CONCERNING OBSTETRICAL DILATATION OF THE CERVIX

CONTRIBUTED TO SURGERY, GYNECOLOGY AND OBSTETRICS

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I MUST protest against the article which Knapp has written for SURGERY, GYNECOLOGY AND OBSTETRICS (November, 1905, vol. i, No. 5), regarding the opinion of the Bossi method expressed by the German Gynecological Society at its 1905 meeting. The article is entirely too optimistic. I, together with other gynecologists, received the impression that at the congress at Kiel, Bossi's method received its long-deserved honorable entombment, while *vaginal Cæsarean section received indisputable recognition as the universal method.* Even Leopold, who introduced the Bossi method into Germany with almost too great enthusiasm, had to come to the conclusion, in his report there, " that the Bossi method was to be recommended to the general practitioner only in cases of effaced cervix, and then only when in great haste." The other speaker, Bumm, in his report, warned the general practitioner against using the Bossi method at all, as the manipulation of the instrument was not entirely simple nor harmless. On the other hand, he spoke of deep cervical incisions, which I have performed and recommended in cases of effaced cervix since 1887, as harmless.

To the amazement of all, Olshausen recommended the Bossi method, also, for the general practitioner, in spite of the fact that Veit had a mortality of only 3 per cent while using vaginal Cæsarean section in cases of eclampsia, and Olshausen had a mortality of 38 per cent while using the Bossi method. When the results of a method are so unsatisfactory as that, the recommendation of an authority cannot help; it rather harms the authority himself, since, under such circumstances, we must come to the conclusion that he lacks the ability to judge properly.

I have the same criticism to offer as to Leopold, whose highly praised clinical successes, together with those of his pupils, I have had occasion to criticise in three articles (1).

In these papers I showed that his results were nothing extraordinary, since, in a total of 24 viable children, 9 (37½ per cent) died as a result of the Bossi method, and that the maternal mortality in eclampsia, in spite of the Bossi method, was not less than the mortality which I (2) computed from some older statistics of the obstetrical clinic at the Charity Hospital concerning 200 cases (1880 to 1892). Leopold gives this mortality as 22.6 per cent. In my record of women confined by obsolete operative procedures and without the Bossi method, the percentage was 23.75 per cent.

On the strength of this unsatisfactory experience in Leopold's clinic, which Leopold looks upon as a success, and on the ground of still worse experiences of other skillful obstetricians, I declined to obtain personal experiences with the Bossi method, because I " feared that by using this method I should draw upon myself accusation of reckless injury or murder."

What does Leopold (3) answer to these remarks? " Dührssen has absolutely no experience with the Bossi method. He quotes, instead, from the insufficient experiences of others. In science we must try a new method sufficiently long before we give a judgment, if we would have that judgment respected. It is quite out of the question that an operator like Dührssen, whom, in my paper at Kiel, I numbered with the masters of our specialty, should exhibit such awkwardness in the employment of Bossi's method that he fears he may be brought before the court, while my assistants can carry out the proceedings without a fault, and with constantly increasing dexterity."

It is true, I cited the experiences of others, but mainly those of Leopold's clinic, and showed in a thorough criticism of each case that the results obtained in them by the Bossi method were not satisfactory, inasmuch as the cervix remained incompletely dilated, and consequently the child was born dead, or the mother was harmed by the long narcosis, hemorrhage resulting from the detachment of a

deep-seated placenta, and bleeding from tears. If these unsatisfactory results were obtained in a clinic where the instrument is used perfectly, we must come to the conclusion that the bad results do not rest on the faulty handling of the instrument, but on the impracticability of the method. The impracticability of the method, and not the fear of my awkwardness in using the instrument, as Leopold insinuates, keeps me from using the Bossi method, and has led me to introduce and use methods that are not burdened with all these drawbacks and dangers. *These methods are the deep cervical incisions in cases of effaced cervix, vaginal Cæsarean section in cases of ineffaced and rigid cervix, and metreurysis with automatic traction in cases of ineffaced but dilatable cervix.*

The second method is reserved for specialists; the two others can be carried out without fear by any general practitioner who has had a surgical training and who operates antiseptically.

Shall we be thrown back a century in our science and our obstetrical art by the Bossi method? Is it so hard for men of science to realize that a tube of soft tissues can tear very easily when, in a comparatively short time, it is stretched from a diameter of 1 cm. to one of 10 cm.? Let them take the finger of a glove, and then as slowly as possible stretch it with a Bossi or any other similar instrument. I warrant you that the finger will tear, even if the stretching be spread over two or more hours, and then not only the finger would tear, but the whole glove as well.

We have found the solution of the original problem of obstetrics — how to empty the uterus before the beginning of labor, in all cases of danger to mother or child, in the shortest time, by the natural passages, and without danger to mother or child in all cases of obstruction to the birth-canal, either by the soft or bony parts — and this solution is not by means of the Bossi method, but by my vaginal Cæsarean section and by Gigli's pubiotomy.

These two methods will almost wholly take the place not only of Bossi's method, but also that of induced premature labor, craniotomy on the living child, symphisiotomy, and classical Cæsarean section.

In order to bring most quickly to general recognition these surgically correct, obstetrically effective, and yet harmless methods for the blessing of mankind, one must not pass over in silence such publications as this last one of Knapp. In my first paper (4) against this method, I showed that Knapp's enthusiasm for it was caused not at all by his own success—in fact, his results were very unsatisfactory. In Knapp's first case, which I mentioned there — a case of placenta prævia, with cervix admitting one finger — the cervix was stretched to the sixth mark, and there only a version was done; also in case 2 — eclampsia, with cervix admitting two fingers — the cervix was dilated to the tenth mark, and only a version was done. In case 4, the dilatation was so slight that a combined version was made, and later, during extraction, the cervix pressed upon the child's neck so firmly that a craniotomy had to be performed. The mother died of pyæmia; "the cervix was largely superficially necrotic, and in *both walls were irregular lacerations, partly putrid.*" In case 5, *craniotomy* on the after-coming head was performed for the same reason as in case 4. In case 7, for the same reason, only a combined version could be made, and afterwards the contraction of the cervix about the neck of the child *caused its death.* A cervical tear had to be closed with three stitches.

Case 3 was the only absolutely favorable case. In an eclampsic primipara, the cervix, which was half a finger-joint long and admitted one finger, was in a half-hour's time, and without any deep injuries (*sic!*), dilated to allow version and the extraction of a living child.

In the other cases, the cervix was already dilated enough to admit three or four fingers; so, simply for this reason, they carry very little conviction. Moreover, in these cases, not one of the children survived.

Together with these cases compiled by Lederer, Knapp himself gives, later, a case which shows the danger of Bossi's method in cases of ineffaced cervix. Primipara, 27 years old, eclampsia in eighth month. In spite of *dilatation for one hour, the right arm of the instrument caused a laceration,* which began at the level of the internal os and traversed the

whole length of the cervix and extended *into the vaginal fornix of the right side, and a broad transverse laceration of the anterior lip* reaching to the region of the internal os, *which could not be sewed*, and therefore had to be tamponed.

As I further remarked in the above-mentioned article, the results of the Bossi method in ten cases of ineffaced cervix in primipara were as follows: Four children were born dead, one mother (the above-mentioned case of Knapp) died, even if Knapp does dispute it, of pyæmia following excessive manipulation of the cervix, and another (Knapp) suffered from a life-endangering cervical tear.

Knapp seeks to direct attention away from the shady side of the Bossi method by discrediting my methods for bloody dilatation, and also myself. This is his conclusion in his article, " Ueber Dührssen's Cervixincisionen," which appeared in the *Prager Medicinischen Wochenschrift*, No. 24, 1903: that neither the incisions nor the intrauterine tampon are my discoveries, and as support for his argument points back to two previous articles, one in the same paper, " Uber Unstillbare Blutungen im Anschluss an die Geburt," and one in the *Klinische Therapeutischen Wochenschrift*, 1902, " Zur Frage des Accouchment Forcé," etc.

Let us now examine a little closer this last-named paper of Knapp's. How little does the following sentence of his agree with the facts: " Bossi's method of forcibly dilating the cervix by operative means within the narrow limit of time allowed the obstetrician shows an undeniable progress in the field of operative obstetrics, and will not yield its place, as regards quickness and surety of success, to any of the previously used methods."

I ask you, Do we not achieve the artificial (I do not say forced) dilatation of the cervix much more quickly and safely by means of deep cervical incisions and vaginal Cæsarean section? Of these methods, Knapp says only the following: " Among the moderns, Bonnaire takes the most conservative view, in that he practises the digital or manual dilatation of the cervix, while Dührssen recommends 'his'[1] incisions. *Multa renascentur quæ jam cecidere!* The first method demands too much time and strength in hurried cases. Dührssen's incisions are surely a radical method, but can become the property of the general practitioner no more than can the vaginal Cæsarean section." Let me remark that if two methods are to be compared, it must be shown what the methods can do, not which method can and which cannot be used by the general practitioner. Moreover, the views of many obstetricians of renown — among them Bumm — as regards the practicability of the two methods, are directly the opposite of that which Knapp takes. Bumm takes the stand with me in saying that the general practitioner should not use the Bossi method, while, on the other hand, he says that deep cervical incisions by my method are without danger. It is therefore absurd when Knapp says, in the above-mentioned article, that " the Bossi instrument for forcible dilatation of the cervix is not less useful in obstetrics and perhaps less dangerous than the forceps, by whose side it rightly takes its place in the obstetrical armamentarium."

What Knapp says of Bossi's method is also true of the author's cervical incisions; namely, that attempts in this direction had already been made. In spite of this fact, most of our colleagues (5) speak of the " *Dührssen* method " of deep cervical incisions, just as they do of the Bossi method. According to Fitch, the priority should be given to the person who gives his discovery to the world, who establishes and recommends it so that it is generally recognized. That I have succeeded in doing, both as regards the uterine tamponade and the deep cervical incisions. That this latter operation had been done before me is no secret. I told all about it (6), naming a great number of authors, in my first complete paper on the subject. However, the fact remains, as I said in my " Monographie über eklampsie " (7), that these " previous incisions gave very bad results, because they were not done in the proper way; that is, they were made too superficially, were practised only on dying women, and through them a septic infection was often brought about. I was the first to demonstrate that four deep cervical incisions made under antiseptic precautions would fully dilate an effaced cervix without tearing farther, and

[1] Regarding the expression " his," Knapp refers to his paper, " Beiträge zur Geschichte der Eklampsie," in which he mentions several authors who performed the operation of cervical incision before me. As if this were his discovery, or as if I had ever suppressed the fact.

thereby causing dangerous hemorrhage, and without exposing the parturient to the danger of sepsis; that, however, they can be used to advantage in eclamptic patients only when they are undertaken before the patient is moribund."

I realized in the year 1888 the revolution which these incisions would cause in the field of operative obstetrics, and in the first edition of my *Obstetrical Vade Mecum* (1890), which has been translated into English, I prophesied a new era for obstetrics, namely, the surgical era, and expressed myself as follows: "*In all cases in which faulty dilatation has to do only with the portio vaginalis, and where a real danger is present for the mother or the child, it is the author's opinion that it is at the present day the duty of the obstetrician who is skillful and antiseptic, and provided with the above-mentioned instruments (including a box containing material for tamponing the uterus), to dilate the cervix completely by means of from two to six deep incisions reaching to the sides of the vagina and to deliver the child.* By means of this method we can conduct labor even with a completely closed cervix and even (i. e., in severe eclampsie in the last weeks of pregnancy." I also said that in combination with these cervical incisions a vaginoperineal incision, consisting of the division of the levator ani of one side, should be made in a primipara with small and rigid vagina.

I would ask of Dr. Knapp to name me any author who had recommended or practised any such method before me, or who had recognized this or any other method as one which is especially fit *to assist to victory a new principle in obstetrics.* The principle is as follows: *that in every operation for the delivery of a child, care should be taken that the mother be protected, but that this protection of the mother should not be obtained by sacrificing the life or health of the child.* Neither mother nor child should be endangered nor their health impaired in any way in an operative delivery. I have labored constantly for eighteen years to bring about the realization of this principle, which has especial regard for the life of the child. The latest result of my work is the vaginal Cæsarean section. I welcome the discovery of another obstetrician, the subcutaneous pubiotomy of Gigli (8), as an operation which almost completely realizes my ideal. It will take the place of the classical Cæsarean section, with its constantly increasing danger of infection, in almost all cases of contracted pelvis.

I notice, moreover, with satisfaction that the correctness of my proclaimed principles and the importance of my methods are recognized in all their completeness in the "operative obstetrics" of von Winckel's *Handbuch of Obstetrics*, and also by authors like Wyder, Sarwey, Kroenig, Schenk, Kleinhans, and in the earlier volumes of Hofmeier and Wertheim. The editor himself, von Winckel, took vaginal Cæsarean section out of the chapter on "Accouchment Forcé," in which other books consider it, and where, according to my opinion, it does not belong, and placed my description of this topic in his *Handbuch* together with the classical and the Porro Cæsarean section under the heading "Herausbeförderung des Kindes auf künstlich geshaffenem Wege." In the same *Handbuch*, Wyder has this to say of the Bossi method: "Taken all in all, the latest reports leave the impression that the original craze for dilatation by Bossi's methods, practically dependent on Leopold's recommendation, has diminished greatly, especially in favor of metreurysis and vaginal Cæsarean section."

In von Winckel's *Handbuch*, I published 248 cases of vaginal Cæsarean section with 33 deaths. To bring my statistics up to November 8, 1905, I add the following cases:

1 case of Everke. Personal communication.

1 case of Th. Becker (Hanover). Personal communication. Died of eclampsia.

2 cases of Wilson. (Radikaler Kaiserschnitt bei Carcinom.) *Monatsschr. f. Geb. und Gyn.*, vol. xxii, No. 5.

1 case of Maiss. (Radikaler Kaiserschnitt bei Carcinom.) *Monatsschr. f. Geb. und Gyn.*, vol. xxii, No. 4.

5 cases from the Jena clinic. *Loc. cit.*, vol. xxii, No. 4.

1 case of Rühl. *Centralblatt für Gyn.*, 1905, No. 46.

2 cases of Staude. *Centralblatt für Gyn.*, 1905, No. 47. (One case died of eclampsia.)

9 cases from the clinic of Berlin University. *Centralblatt für Gyn.*, No. 48. (One case died of eclampsia.)

In all, 22 cases (of which 3 were followed by extirpation of the uterus), with three deaths from eclampsia.

The total number of vaginal Cæsarean sections known to me is therefore 270, with 36 deaths — a mortality of 13.3 per cent. Among these are 50 cases of radical vaginal Cæsarean section (Cæsarean section with subsequent extirpation of the uterus), with 5 deaths — a mortality of 10 per cent.

Having discussed these things at some length I shall now return to Knapp's personal attack.

Knapp himself has learned how important the exact carrying out of a carefully worked out method is to insure a result, since he succeeded in checking an atomic hemorrhage only after a third tamponade, having — according to my directions — filled the uterus with iodoform gauze and the vagina with cotton. According to Knapp's conviction, the intrauterine tamponade is one of the most beneficent achievements of our therapy. "Undoubtedly, innumerable women have been saved from bleeding to death by its timely and skillful use." But the tamponade, according to Knapp, "is by no means original with Dührssen. This is equally true of the Dührssen incisions, as I have explained in another place. Lately, Bossi, also, called attention to the fact that in Germany the intrauterine tamponade, as well as the cervical incisions, went quite wrongly under Dührssen's name." Bossi attributes the discovery of the uterine tamponade to Miranda, an unknown Italian. In any case, Wendelstädt, the state physician and obstetrician of Wetzlar, whom, as a result of my historical studies, I designated as the originator of the uterine tamponade, published his method before Miranda — in 1806 (9). If named after me, the fact rests on the following circumstances:

1. I demonstrated that the tamponing of the uterovaginal canal was the safest means of stopping hemorrhage.

2. I demonstrated that it was harmless if carried out according to my directions.

3. By means of my numerous publications I have brought about its general and successful application, instead of an occasional one which was generally too late.

4. I showed that the existence of a safe method for controlling atonic post-partum hemorrhage had enlarged the indications for operative delivery. In like manner, my methods of bloody dilatation of the cervix rest upon the tamponing of the uterovaginal canal.

Since, in spite of my numerous publications, I find that my method is wrongly carried out and the failure attributed to the fault of the method. I must not let the tamponade-box constructed and recommended by Knapp pass without criticism. It lacks the cotton, which, according to my instructions, should be packed in a specially made and sterilized box together with the iodoform strips, and which serves in severe cases of atony as a life-saving vaginal tamponade, as Knapp himself has learned. Knapp complains of my boxes, saying they are hard to open. Well, he himself gives a remedy for that; namely, to loosen the fastening beforehand, an operation which always succeeds with a little caution, or by means of pincers, which can be found in every household, or an artery-forceps from the obstetrical armamentarium. *Therefore, let us continue the use of my boxes, which contain, ready for use, and sterile, all the material necessary for tamponing the uterovaginal canal.* I always carry a box No. 1 and a box No. 2 in my satchel, and, moreover, order two similar boxes from the drug-store for each labor case. I use these latter first, after having loosened their fastenings directly on arriving at the house.

Now as regards Knapp's conclusions in this journal. They also deserve criticism.

In speaking of the *induction, or, rather, the hastening of abortion*, he mentions only a gauze tamponade of the cervix and vagina, without mentioning my much more satisfactory method of tamponing the whole uterovaginal canal.

This method causes in from 12 to 24 hours either the delivery of all the uterine contents, or such a dilatation of the cervix that metreurysis with the automatic traction recommended by me, or a manual emptying of the uterus may be undertaken.

The induction of premature labor by means of bougies is so uncertain in its results that metreurysis is much to be preferred. This can be used in any case in which the cervix admits one finger — either without previous dilatation or after using a laminaria tent. Then

one may insert either a thin colpeurynter, or if the cervical canal is somewhat wider, a dumb-bell-shaped Champetier de Ribes' bag, which is even more sure to bring on pains, and, after its spontaneous expulsion, makes possible an easy delivery of the child. In these cases, cervical tears occur only when the metreurynter is dragged quickly through a rigid cervix; therefore if the portio is visible at the vulva and the os does not dilate, no further traction should be used. In these cases, if danger threatens either mother or child, the mechanical dilatation must make way for my methods of bloody dilatation; namely, vaginal Cæsarean section in cases of uneffaced cervix, and deep cervical incisions if the cervix is effaced. As regards the latter, as I have contended times without number, Knapp's conclusions, that they tear further and lead to uncontrollable hemorrhage, are wrong; an improbability if the incisions are carried out according to my instructions. I have already shown in previous papers (10) how readily some gynecologists cite cases in opposition to my operation of deep cervical incisions which have not been operated on according to my directions. The fact, however, remains, that many general practitioners who have studied under me have obtained splendid results by this same operation.

*Of the six indications which Knapp gives for the use of Bossi's method, I cannot allow a single one to stand.*

1. In abortion, the dilatation by means of laminaria tents and the simultaneous tamponade of the whole uterovaginal canal (which at the same time checks any hemorrhage which may be present) is more to be recommended than the Bossi method, as the instrument may cause severe lacerations and often cannot be introduced at all.

2. Slight dilatation with the finger, Hegar dilators, or a laminaria tent suffices for the introduction of a metreurynter.

3. To undertake the dilatation of the soft parts by means of the child's body does not satisfy the demands of modern obstetrics, for by so doing the child is liable to die on account of the resistance of the soft parts.

4. To dilate the external os as a preparatory act to an operative delivery, my deep cervical incisions are much simpler in technique, more quickly accomplished, and, as Bumm also emphasizes, without danger.

5, 6. My cervical incisions can also be used in the same advantageous way in cases of completely closed os and rigid portio, provided, of course, that the cervix is effaced. If this is not the case, vaginal Cæsarean section is the operation of choice in cases of eclampsia, in cases about to die, and post-mortem. However, under these circumstances, it cannot be a question of accouchment forcé, either in cases of deep cervical incisions or vaginal Cæsarean section. Both methods, when properly carried out. dilate the cervical canal in such a manner that the extraction of the child is easy and in no way forced.

We have learned by practical experience that vaginal Cæsarean section is to be preferred to the Bossi method in *premature separation of the placenta.* In *missed labor* it is better still, for here dilatation by means of laminaria tents, the uterine tamponade, and the metreurynter serve all purposes, since in these cases it is not necessary to empty the uterus so quickly. The same holds good in cases of partial retention of the placenta or membranes, with consequent puerperal fever, in which case the uterine tamponade limits the intrauterine putrefaction and produces in a few hours a protective dilatation, while the lacerations caused by the Bossi instrument would furnish new entrance points for an infection.

I cannot, therefore, subscribe to the use of the Bossi method in combination with pubiotomy, and as regards the contraindications given by Knapp — the possibility of lacerations and of insufficient dilatation — these are present in every case of undilated cervix, and in an effaced cervix with head engaged, it is, according to Knapp, absolutely impossible to introduce the Bossi instrument.

*When, then, can we use the Bossi method?*

*Obstetricians who try to improve the method by improving the technique and the instrument, or by special aptitude in the use of the instrument, are on the wrong road.* Perhaps several cases, in which simpler methods would have more certainly succeeded, have resulted favorably; then their enthusiasm carries them away until a case comes along, such as Knapp him-

self saw, where the patient dies from hemorrhage, and the practitioner in charge, as we often hear, may expect to be accused of causing death through negligence.

It is decidedly false logic to say of an eclamptic patient that she died of eclampsia, and not from the lacerations produced by the Bossi method. *They die of the combination of a severe illness and the injuries produced.* The accuracy of this fact is shown by the small mortality in severe eclampsia when vaginal Cæsarean section is used, in comparison with the frightful mortality when the Bossi method is used. The statistics show three per cent and thirty-eight per cent, respectively, as I stated above.

We find in the literature of the subject numerous cases of severe injuries following the use of Bossi's method. The latest report on the subject, by Staude (11), reads as follows: "Staude now reports four cases in which Bossi's method was used, all dying of eclampsia. They all had cervical lacerations extending to the peritoneum. The dilatation measured 7 to 9 cm. and consumed in each case at least an hour's time. Staude prefers vaginal Cæsarean section, as he has never seen a further tearing of the incisions, although there are cases in which, if one does not wish to make deep vaginal incisions, Bossi's is the only possible method.

*I warn you also against the use of the instrument recommended by Knapp.* Regarding all these instruments, we can with slight alteration still note the words from Goethe's *Faust:*

"Geheimnesvoll am lichten Tag
Lässt sich Natur des Schleiers nicht berauben,
Und was sie Dir nicht offenbaren will,
Das zwingst Du ihr nicht ab mit Hebeln und mit Schrauben."

## BIBLIOGRAPHY


1. DÜHRSSEN. Ist die Bossi' sche Methode, wirklich als ein Fortschritt in der operativen Geburtshülfe zu bezeichnen. Archiv. für Gyn., vol. lxviii, No. 2, 1903. Darf die Bossi'sche Methode dem praktischen Arzt empfohlen werden? *Loc. cit.*, vol. lxxv, No. 2, 1905. Nochmals Bossi und vaginaler Kaiserschnitt. *Loc. cit.*, vol. lxxvii, No. 1, 1905.
2. DÜHRSSEN. Eklampsie. Archiv. für Gyn., vols. xlii, xliii.
3. LEOPOLD. Archiv. für Gyn., vol. lxxvii, No. 1.
4. DÜHRSSEN. Archiv. für Gyn., vol. lxviii, No. 2, pp. 378, 379.
5. See, for instance, Winckel's Handbuch der Geburtshülfe.
6. DÜHRSSEN. Ueber den Werth der tiefen Cervix und Scheiden-Damm-Einschnitte in der Geburtshülfe. Archiv. für Gyn., vol. xxxvii, 1890.
7. DÜHRSSEN. Winckel's Handbuch der Geburtshülfe, vol. ii, pt. 3, p. 2407.
8. DÜHRSSEN. Zur subcutanen Gigli'schen Hebotomie. Berliner Klinische Wochenschrift, 1905, No. 49.
9. See DÜHRSSEN. Ueber die Behandlung der Blutungen postpartum. Volkmann'sche Samml. klin. Vortr., No. 347 (1889).
10. DÜHRSSEN. Archiv. für Gyn., vol. lxxv, lxxvii.
11. Centralblatt für Gyn., 1905, No. 47, p. 1449.

# UNITERMINAL AND BITERMINAL VENOUS TRANSPLANTATIONS

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## SUMMARY

I. Definitions
II. History
III. Conditions Necessary for the Successful Transplantation of Veins
IV. Uniterminal Venous Transplantation
V. Biterminal Transplantation
VI. Biterminal Transplantation of a Tube of Peritoneum on an Artery
VII. Surgical Applications of Venous Transplantations
VIII. Conclusions
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## I. Definitions

TRANSPLANTATION of veins consists in dissecting and cutting a vein and grafting it onto some other point of the circulatory apparatus.

There are two kinds of venous transplantations — uniterminal and biterminal.

The transplantation is *uniterminal* when only one of the ends of the vein is united to an artery or another vein. The lower thyroid vein, for instance, having been dissected, is cut at a point some distance from the gland. Its central end is ligated, while its peripheral end is implanted on the carotid artery. Then the red blood flows through the thyroid vein, which, from a functional standpoint, becomes an artery. (Figs. 1, 2.)

The transplantation is *biterminal* when the two ends of a venous segment are united to the cut ends of an artery or of another vein, or of an artery and a vein.

This biterminal transplantation may be incomplete or complete.

It is *incomplete* when the ends, only, of the venous segment are dissected, and its middle portion retains its normal connections with the surrounding tissues. A small portion of the femoral artery, for instance, having been extirpated, the adjacent segment of the femoral vein is exposed, its two ends cut and isolated from the other tissues, and then united to the ends of the artery. The middle portion of the venous segment remains in its normal position, retaining its sheath, connections, and collateral branches. (Fig. 3.)

It is *complete* when the venous segment, instead of being allowed to retain its normal connections and its collateral branches, is completely dissected and extirpated before being interposed between the two cut ends of another vessel. For example, a segment of the external jugular vein is exposed, dissected, and completely extirpated. The carotid artery is cut and a segment a little shorter than the venous segment is resected. Then, between the ends of the artery, the venous segment is interposed and fixed. (Fig. 4.)

As before intimated, the uniterminal and biterminal transplantations of veins may be performed on an artery or on another vein. Thus far we have only in a few instances transplanted a vein onto another vein. For instance, in the transplantation of the heart the external jugular vein was anastomosed to the superior vena cava, in order to provide a blood-supply for the right side of the heart. In the transplantation in mass of kidneys, or ovaries, biterminal transplantation of a segment of vena cava of one animal onto the cut ends of the vena cava of an other animal is performed. Several other examples might be cited, but owing to the fact of its more numerous applications, this paper will deal mainly with the transplantation of veins to arteries.

In the complete biterminal transplantations the transplanted vein is ordinarily taken from the operated animal itself. It is an autoplastic transplantation. It could be called a homoplastic transplantation if the vein were taken from another animal of the same species, while if the vein were taken from an animal of a different species it could properly be called a heteroplastic transplantation. The problem of

the homoplastic and heteroplastic transplantations is very important in dealing with the problem of transplantations of organs and limbs; but in the venous transplantations, owing to the nature of the venous system, it is always possible to extirpate a few centimeters of vein without seriously interfering with the circulatory apparatus in general. Thus the operated subject supplies all the venous material necessary for most transplantations. It has been unnecessary, therefore, to perform any but autoplastic transplantations, and only this kind of transplantation will here be discussed.

## II. History

The transplantation of veins is a new operation, and has been largely developed in this laboratory. Therefore its history is short.

Experimental study of this operation was begun in France in 1902. The operations consisted of end-to-end arterio-venous anastomosis. The method of anastomosis described in the same year was used (1). The first attempt at suturing the end of an artery to the end of a vein was made by Berard and Carrel in the laboratory of Auguste Lumière (2). The femoral artery and the saphenous vein of a large dog were exposed in Scarpa's triangle and the central end of the artery was united to the peripheral end of the vein. The red blood was made to flow through the vein, which, as a result, was distended, pulsated, and exhibited the main arterial characteristics. The anastomosis adequately withstood the arterial blood-pressure, but no physiological results were observed, as the animal died from infection two days after the operation.

Afterwards, several other experiments were performed by Carrel and Morel in the laboratory of Professor Soulier in the University of Lyons. The first dog operated on made a good recovery, but eight days after the operation the vessel was found to be occluded by a fibrous clot. The next experiment was entirely successful (3). The external jugular vein of a dog was dissected and cut, and its peripheral end united to the central end of the carotid artery. The red circulation through the vein was very active. Several weeks after the operation, the animal was presented before the Société nationale de médecine, at which time the external jugular vein pulsated like an artery. By ausculation a strong systolic murmur could be heard at the point of anastomosis (4). During the several months the animal was under observation the results remained satisfactory.

This experiment showed that a vein was able to perform arterial functions and that venous transplantations were possible.

In 1903, Exner (5) endeavored to perform this same experiment; that is, the union of the central end of the carotid artery to the peripheral end of the jugular vein. He employed Payr's method of anastomosis, viz., introduction into the lumen of the vessels of resorbable tubes of magnesium, which method had proved

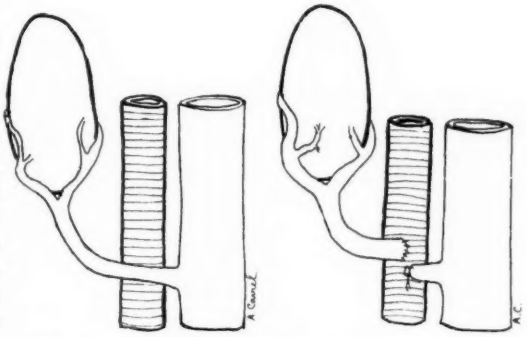

Fig. 1. Thyroid gland, thyroid vein, carotid artery, jugular vein, in normal relation.

Fig. 2. Transplantation of thet hyroid vein on the carotid artery.

to be very successful in arterial anastomoses. But, in the attempts of arteriovenous anastomoses, it completely failed, thrombosis always occurring. Hopfner (6) also undertook to unite an artery and a vein end to end, but was unsuccessful. Payr (7), after having briefly mentioned the experiments of Exner and of Hopfner, concluded by saying that in the attempts of arterio-venous anastomosis, thrombosis always occurred, owing to the fact of the increased blood-pressure. "Der die dunnwandige Vene übermachtig aufblahende Blutdruck führte gerade so wie bei den ubrigen Beabeitern dieser Frage auch bei Hopfner stets zur Thromboses. Verschiedene Behelfe, die mit jenem von Exner bei seinen Versuchen

Fig. 3. Incomplete biterminal transplantation; femoral vein, isolated segment of the femoral vein, femoral artery.

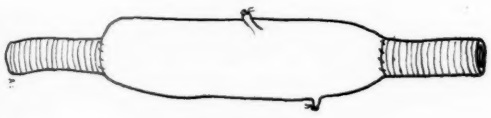

Fig. 4. Complete biterminal transplantation; carotid artery and extirpated segment of the external jugular vein.

angewendeten ubereinstimmen, vermochten die Resultate nicht zu verbessern."

In 1902, however, Carrel had shown that arteriovenous anastomoses were possible, and considered that all the transplantation of veins were feasible. Our present results have entirely confirmed this opinion.

In 1905 we began experimenting in this laboratory [1] with the view, among others, of making a complete study of the transplantation of veins. Several series of experiments were undertaken in order to study the results of the uniterminal and biterminal venous transplantations, and they were thoroughly successful. At this point we wish to thank Dr. Stewart for his interest in this work and his valuable suggestions, which have contributed in no small degree to its success.

## III. Conditions Necessary for the Successful Transplantation of Veins

They are two in number: *a*) a method by which the artery and the vein may be smoothly united without hemorrhage, stenosis, or thrombosis, and *b*) a rigid asepsis.

*a. Operative technique.* The end-to-end arterio-venous anastomoses are the most difficult of the vascular anastomoses. All the investigators and clinicians who have tried to perform this kind of operation have failed, as far as we know; thrombosis and obliteration of the vessel always occurring. These results are, apparently, not due, as Payr believes, to the effect of the increased blood-pressure on the wall of the vein. The success of our own experiments indicates strongly that the thrombosis observed by Exner and Hopfner was probably the result of a faulty technique.

It is difficult indeed to obtain a smooth union of the ends of the vessels, on account of the difference in size of the lumen of the artery and vein, and in the thickness of their walls, the vein being larger and thinner-walled than the artery. In order to approximate the opening of the vein to that of the artery, the wall of the former must be folded or puckered. (Figs. 5, 6.) On account of this venous folding, and of the thickness of the arterial wall, it is difficult to obtain an accurate approximation of the endothelium of the two vessels. Through these longitudinal foldings, when they are irregular or too large, hemorrhage may occur at the line of suturing. (Fig. 6.) Besides, in the bottom of the foldings, and in the inter-endothelial spaces, fibrin may be deposited and form the nucleus for an occluding thrombus. These obstacles largely serve to explain the negative results obtained by numerous investigators.

In order, therefore, to successfully transplant veins onto the arterial system, it was necessary to have a technique permitting the union of the vessels without hemorrhage or thrombosis. Besides, positive results must be constant, for a method is not satisfactory otherwise. In the first experiments (1892), the technique employed did not always yield good results. Thrombosis often occurred. This was due mainly to the fact that the delicacy of the endothelium of the vessels was not appreciated. This led to a realizatiou of the fact that ordinary surgical methods are inadequate. The methods, for instance, which give splendid results in abdominal surgery are much too rough for use in vascular surgery. The surgery of the blood-vessels is a new and special field, and the operative handling must be delicately adjusted and adapted to the nature and the reactions of the tissues.

According to these considerations, our technique was improved by degrees. The threads and the needles were the finest and the strongest obtainable. The threads were ster-

[1] The work in this laboratory has been conjointly performed.

ilized in vaseline, and applied when heavily coated with the same. The vessels were handled very gently, and the endothelium was protected from drying by isotonic sodium chloride solution or by sterilized vaseline. No dangerous metallic forceps were used. The greatest care was exercised to obtain accurate and smooth approximation of the endothelium of the vessels. Finally, we developed a technique which is equally well adapted for arterio-arterial, veno-venous, or arterio-venous anastomoses, and which yields uniformly successful results.

This new technique has been used since August, 1905. Numerous arterio-venous anastomoses and transplantations of veins have been successfully performed. Union of the walls of an artery and a vein to each other may be made without the subsequent occurrence of hemorrhage or stenosis. On establishment of the circulation, the vein, of course, becomes distended with red blood. The sutures easily support the increased blood-pressure, and no breaking or tearing out of the stitches has been observed. When the vein is not much larger in size than the artery, the union of the vessels is almost perfect, and no blood escapes from the line of suturing. But when, on account of the size of the vein large foldings of the wall are necessary, small hemorrhages may occur from the line of anastomosis, at one or more points. These hemorrhages are easily stopped by inserting one or two stitches. (Fig. 6.) No secondary hemorrhage has ever been observed.

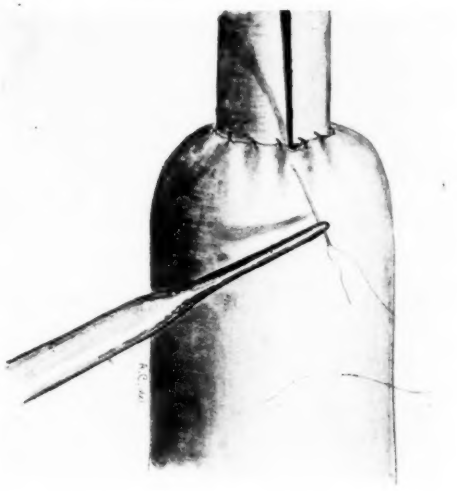

Fig. 6. Arterio-venous anastomosis; hemorrhage through the end of one of the venous folds.

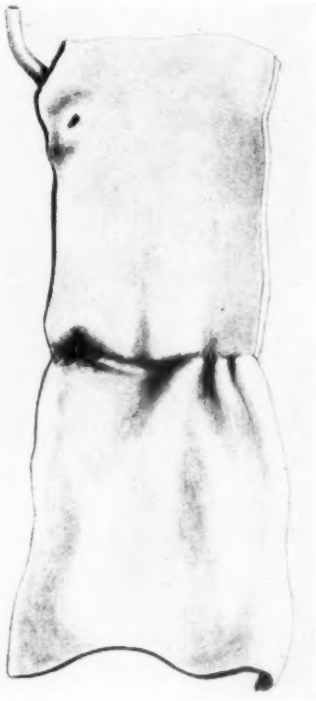

Fig. 5. Arterio-venous anastomosis; internal part, showing the folds of the veins, which are very irregular.

Stenosis or occlusion only occurs as a result of faulty technique. For instance, during the anastomosis of the central end of the femoral vein and the peripheral end of the femoral artery, a pair of hemostatic forceps slipped and were replaced by a stronger pair, which, owing to the strength of the spring, badly injured a portion of a wall of the vein. Several weeks after, a stenosis which greatly reduced the caliber of the vessel was observed. In another case a method of union by invagination of the end of the artery into the opening of the vein was used. One month after the operation the pulsations of the vein were yet easily detected, but much weaker than at the

time of the operation. Probably a progressive stenosis of the anastomosis had taken place. But these cases are exceptional, and have been only rarely observed.

At the present time it is impossible to state whether the good results obtained will be permanent, but it seems probable that no complications will develop that will seriously modify the circulatory functions of the vessel. The animals were kept alive in order to observe the possible changes undergone by the anastomoses and supply the data for this statement. They have been repeatedly and carefully examined, and now, seven months after the operation, the circulation through the veins anastomosed to arteries is apparently as active as it was on the day of the operation. It is proposed to keep these animals under close observation for a year or more, in order to determine definitely the permanency of the results.

As before stated, the second condition necessary to the success of the anastomosis is a rigid asepsis.

It seems that the degree of asepsis under which general surgical operations may successfully be performed is probably insufficient for good results in vascular operations. Generally, it is considered that a wound is aseptic when it does not suppurate, and when healing occurs "per primam intentionem." But it should be remembered that this clinical asepsis is far from the ideal condition of absolute asepsis. Between absolute asepsis and infection, which is evidenced by the ordinary symptoms of inflammation occurring in the operated area and by suppuration, there are many intermediate degrees of attenuated infection. It is certain that every operative wound, though clinically aseptic, is more or less infected. This infection is not accompanied by the classical symptoms of inflammation; i. e., there is no fever, œdema, redness, pain, or heat of the tissues, or if these phenomena are present, they escape detection. The tissues unite "per primam intentionem," and from a clinical standpoint all the reparative processes occur as if the wound were really aseptic.

In this so-called aseptic healing of a wound there are clinical symptoms which render possible the detection of such slight infection. The tissues may be found to have lost their softness; the deep portions of the wound, to be a little hardened; the skin adherent to the subjacent tissues, and sometimes its color around the thread slightly reddened. All these symptoms may disappear within a few days or a few weeks. Nevertheless, in such a case it is certain that an infection occurred, though only in as light degree. It is probable that the more marked degrees of this kind of infection may be sufficient to cause thrombosis in blood-vessel anastomoses.

In the first experiments made in France, the coexistence of rapid and apparently aseptic healing of the wound and of obliterative thrombosis was frequently observed. But at the same time it was found that the skin was sometimes a little reddened along the line of suturing; that the deep tissues were hardened around the vessel; and a thickening was always perceptible to the touch, especially at the point of anastomosis. Direct observation by dissection, eight or ten days after the operation, showed a strong inflammatory reaction of the connective tissue in the region of the anastomosis. The connective tissue sheath of the blood-vessel was markedly thickened, and the neighboring aponeuroses and muscles were often found adherent to the vessel itself, the latter being occluded by a clot.

In our present experiments, aseptic precautions are as rigidly observed as possible. Scrupulous care is taken to prevent infection. The asepsis is very far from being perfect, but it is, however, far more perfect than in the first experiments. The result is, that healing of the wounds is very rapid; the skin is not adherent to the subjacent tissues; there is no reaction of the connective tissue, and no inflammatory thickening of the external sheath of the blood-vessel; and thrombosis does not occur. Even in the cases where an extensive dissection of the muscles of the neck is made — for instance, in the transplantation of the external jugular vein behind the trachea and its anastomoses to the carotid artery of the opposite side — the tissues, six days after the operation, were found soft and normal. There was no thickening of the connective tissue around the vessel, and the circulation through the anastomosis was excellent. It is probable,

therefore, although we cannot affirm it, that, in order to obtain constant good results in blood-vessel surgery, the degree of asepsis must be higher than is necessary in general surgery.

## IV. Uniterminal Venous Transplantation

As before stated, a uniterminal transplantation consists of dissecting a vein, cutting one of its ends, and grafting it onto another vessel.

This operation may be divided into two stages: *a*) dissection of the vessels, and *b*) their anastomosis together.

The vein may be rapidly dissected by means of a knife or a pair of forceps. The venous wall, notwithstanding its thinness, is very strong. It is unnecessary to dissect away the connective tissue which surrounds the vessel, though a very close dissection can be made without producing thrombosis. It is possible to dissect and transplant the entire length of a vein. We have often closely dissected the thyroid vein from its terminal branches to the internal jugular vein, and the external jugular vein throughout the greater portion of its length in the neck, without subsequent coagulation occurring. Even the veins may be handled with the fingers, with comparative roughness, without producing sufficient injury to produce thrombosis, provided the wall be not injured by a metallic or other hard or sharp instrument. In their experiments on suturing arteries, Jaboulay and Briau observed that the clots occurred at points of the arterial wall that were injured by the forceps. It is therefore exceedingly important that the clamps used for temporary hemostasis be smooth-jawed, and not too strong in the spring, for, if the endothelium is only slightly injured, coagulation may occur. In a case of a plastic operation on the aorta, the wall of the vessel was slightly injured by a thumb-nail. No obliterative coagulation occurred, but afterwards a small deposit of fibrine was observed at the point.

While dissecting the vein, all the collaterals, even the smallest ones, must be ligated, for if the hemorrhage is small when the vein is yet a vein, it may be dangerous when it becomes filled with red blood under arterial pressure. Several times we have observed large arterial hemorrhages through such collaterals after the re-establishment of the circulation. Of course, it is always easy to control but it is better to make careful ligations while dissecting.

The actual anastomoses of the vessels together are the most important stage of the operation. They may be of two kinds; viz., *a*) termino-terminal, or end-to-end, and *b*) termino-lateral.

*The termino-terminal anastomosis* (Fig. 7) may be performed in nearly all cases, even when the size of the vessels differs greatly. An artery may easily be united to a vein of twice its caliber. On the contrary, it is more difficult to unite a small vein to a larger artery, for the venous wall is easily folded, while the artery, on account of its thick walls, is not. The more nearly similar the diameter of the vessels, the more easily successful anastomosis may be performed. When the vein is much larger than the artery and the consequent foldings of the vein in making the anastomosis are irregular, as may happen if the operation is performed without sufficient care, hemorrhage occurs at the line of union. Fibrin may be deposited in the bottom of the foldings and in the miniature gaps occurring between the endothelial coats of the artery and vein. Therefore, when the difference in size of the artery and vein is too great, instead of end-to-end anastomosis it is better to perform lateral implantation of the end of the vein into the wall of the artery. (Fig. 8.)

This termino-lateral arterio-venous anastomosis is more difficult than the former. It should be used only when the end-to-end anastomosis seems inadvisable, owing to the differences in size of the vessels or when the experimental result sought for indicates it. For instance, when a segment of intestine is transplanted into the neck for the purpose of establishing communication between the cut ends of the œsophagus, the end-to-end anastomosis of the intestinal vein to the jugular vein is impracticable, owing to the enormous difference in size of the vessels. It then becomes necessary to make a lateral implantation of the end of the small vessel on the wall of the jugular vein. Or this lateral implantation is performed in order to obtain certain

Fig. 7. End-to-end arterio-venous anastomosis.

modifications of circulation, as, for example, lateral implantation of the central end of the external jugular vein on the common carotid artery, in order to diminish the amount of blood in the peripheral portion of the artery.

Although the termino-lateral anastomosis is somewhat more difficult than the end-to-end anastomosis, it is by no means impracticable on this account. By making a triangular opening larger than the lumen of the vein, through the wall of the artery, and taking care to have an accurate approximation of the endothelial surfaces of the vessels, the anastomosis is very satisfactory, as absolutely no blood escapes and no stenosis of the vein is produced.

A third kind of anastomosis, more rarely used than the kinds above described, may also be mentioned. When the vein is exceedingly small, so small that a direct anastomosis is impossible, it is dissected as far as its junction with a larger vein. The wall of this vein around the mouth of the small vessel is then resected and grafted onto the wall of the artery.

Fig. 8. Lateral implantation of an end of a vein on the wall of an artery.

In these uniterminal transplantations, the vein may be united with another vein or with an artery. The transplantations of veins on veins are ordinarily made in the transplantation of organs, and will be described in detail elsewhere. It may be made, also, in order to establish a communication between two venous systems; for instance, between the splenic vein and a lumbar vein for obtaining an anastomosis of the portal and of the general venous systems.

As previously stated, this paper will deal mainly with the transplantation of veins onto arteries.

There are six possible varieties of this operation, as the central end or the peripheral end of the vein may be united to the central end, the peripheral end, or the wall of the artery. But as the anastomosis of the central end of the artery to the central end of the vein is practically the same in result as lateral implantation of the artery onto a vein, and as the anastomosis of the peripheral end of the vein to the wall of the artery produces practically the same results as the anastomosis of the peripheral end of the vein to the central end of the artery, they do not deserve special mention. Four varieties only will therefore be described.

1. *Union of the central end of the vein to the peripheral end of the artery.* (Fig. 9.) Anastomosis of the central end of the external jugular vein to the peripheral end of the common carotid artery is an example of this kind of operation. It produces a vessel composed in its upper portion of the carotid artery and in its lower portion of the external jugular vein. (Fig. 10.) The pressure in this portion of the artery becomes lower than the normal blood-pressure, and the direction of the blood-stream is reversed. The jugular carries toward the heart red, instead of dark blood. As a result, functionally the carotid artery becomes a vein filled with red blood, being comparable in this respect to the pulmonary vein. It is probable that the wall of the artery undergoes marked anatomical changes. Owing to the lowering of the blood-pressure, its wall may become

thinner and the elastic and muscular layers modified, but at the present time we cannot go further into this point. But, as we have a dog in good health upon which this operation was performed nearly seven months ago, we shall subsequently be enabled to discuss it further.

In the aforesaid experiments, the red blood which flows through the artery comes from the collateral branches of the carotid artery and from the arterial circle of Willis. But

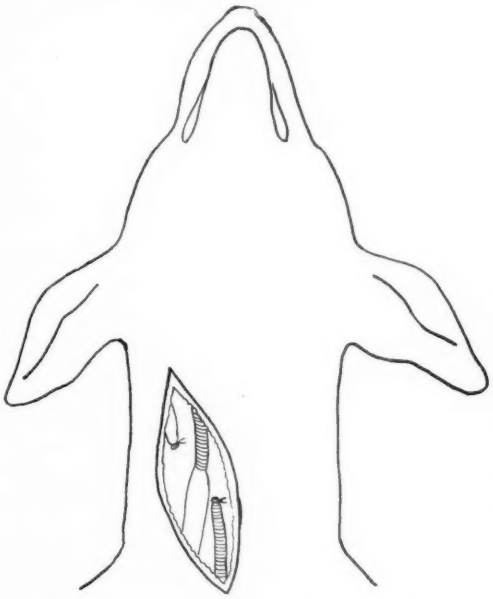

Fig. 9. Anastomosis of the peripheral end of the carotid artery to the central end of the external jugular vein.

when the artery chosen has no collaterals, the blood which fills the artery after the operation must come from the capillaries. This kind of operation is easily performed on the vessel of the thyroid gland. For instance, all the vessels of the thyroid gland were ligated except the superior thyroid artery and vein. The peripheral end of the thyroid artery was then anastomosed to the jugular vein or to the central end of the thyroid vein (Fig. 11), while the peripheral end of the thyroid vein was united to the carotid artery. The direction of the circulation was reversed through the capillaries as the artery became filled with dark blood which flowed afterwards into the jugular vein. The artery became, functionally, a vein filled with dark blood. By continuing the examination of the vessel of a dog which underwent this operation six months ago, we shall be able to determine the anatomical changes in the artery. From a clinical standpoint, the circulation of the blood in these conditions appears to be normal, and the systolic expansion of the gland is similar to the systolic expansion of the unoperated gland.

2. *Union of the central end of the vein to the wall of the artery.* It is evident that after this operation a large part of the red blood of the artery returns toward the heart through the veins. In several cases the central end of the external jugular vein was united to the wall of the common carotid artery. (Fig. 12.) An abundant portion of the red blood flowed into the vein through the anastomosis, with a strong thrill. The vein, retained its venous functions, i. e., it conveyed blood toward the heart, but was filled with arterial blood. The artery also retained its normal functions, but its blood-pressure was lowered. Tracings were taken, and they showed that after the establishment of the circulation through the anastomosis, the blood-pressure in the artery is markedly diminished. This result is quite natural, for the lateral implantation of the central end of the jugular onto the wall of the carotid artery permits of a kind of continuous hemorrhage from the carotid into the vein. When this operation is made on the jugular and the carotid, it does not apparently alter the character of the circulation in general.

3. *Union of the peripheral end of the vein to the peripheral end of the artery.* This operation was performed on arteries having no, or very small, collaterals. The result was the reversal of the circulation through the vein. The artery becomes filled with dark blood, venous in character. If, for instance, the peripheral end of the right renal vein be united to the peripheral end of the left renal artery, the dark blood from the right renal vein would flow through the left renal artery, the left kidney, the left renal vein, and thus into the vena cava.

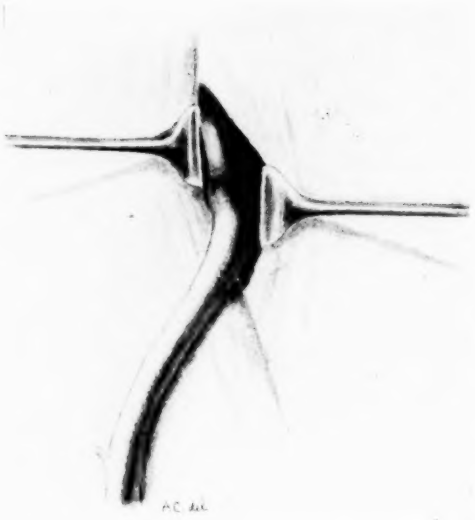

Fig. 10. External jugular vein, end to end, united to the carotid artery.

Several operations were performed on the renal artery and the branches of the portal vein. The vessels of the lumbar region were exposed by means of a half-circular transversal laparotomy, the body of the animal being put in hyperextension. The renal artery was then cut and its peripheral end united to the pancreatico-duodenal vein, or to the splenic vein. By way of the anastomosis, the dark blood from the portal system then flows through the kidney. (Fig. 13.) In one case, a partial occlusion of the portal vein was established immediately below the liver. All the nerves of the kidney were cut, in order to produce a vasodilatation of the blood-vessels of the organ, thus facilitating the circulation. The peripheral end of the main renal nerve trunk was united to the "grand abdomino-genital" nerve. After this operation, abundant dark blood coming from the portal vein traversed the renal artery, the kidney, and the renal vein, and flowed into the vena cava.

Functionally, this operation transforms the renal artery in a branch of the portal venous system.

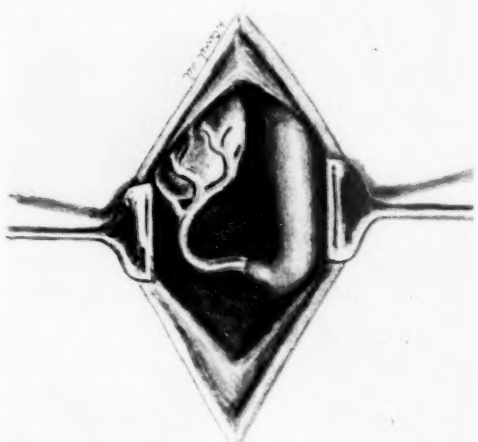

Fig. 11. Anastomosis of the peripheral end of the superior thyroid artery on the central end of the superior thyroid vein. (Reversal of the circulation through the artery, the thyroid vein being united to the carotid artery.)

4. *Union of the peripheral end of a vein to the central end of an artery.* It is evident that, from a functional point of view, this operation transforms the vein into an artery. Several series of experiments were performed. The external or internal jugular or the thyroid veins were united to the carotid artery; the femoral or the long saphenous veins to the femoral artery; and the inferior vena cava to the aorta.

*The transplantation of the peripheral end of the external jugular vein onto the central end of the common carotid artery.* The right external jugular vein was exposed, thoroughly dissected, and cut near the root of the neck. Its peripheral end was inserted between the sternomastoideus and the sternohyoideus muscles and united behind the trachea to the central end of the left carotid artery. (Fig. 14.) On release of the hemostatic clamps, the vein became filled with red blood and pulsated like an artery, it being transformed, from a functional standpoint, into an external carotid artery.

The vein is able immediately to perform the more important arterial functions. Its wall adequately supports the increased blood-pressure. Even when the carotid artery is anastomosed to a more delicate vein, such as the internal jugular or the thyroid, the sudden increasing of the pressure, apparently, does not

injure the wall. In size, the vein always appears to be very much enlarged. Clinically, this operation does not produce general or local symptoms, if it deals only with vessels like the carotid and the external jugular vein. Even when the central end of the carotid is anastomosed to the peripheral end of the internal jugular vein, the dog manifests no abnormal symptoms. A dog on which this operation was performed three months ago is now living, and appears absolutely normal in all respects. But if the amount of red blood flowing to a gland is similarly increased, as in the anastomosis of the carotid and the inferior thyroid vein (Figs. 15, 2), modifications of the gland are observed. For several days after the operation there is a general enlargement of the gland, but it disappears. In goiter, marked changes occur after this operation.

One of the most interesting observations was made on a case of symmetrical, parenchymatous goiter, in which the animal exhibited pronounced general symptoms. About fifteen days after the operation, a diminution in size of the gland on the operated side was obvious, and to the touch it appeared harder and denser in structure than before. Coincidently, there occurred a marked improvement in the general conditions. Both the change in the gland and in the general symptoms were of a progressive character, as now, six months and half after the operation; the operated gland, as well as the unoperated one, is greatly decreased in size, though still larger than normal, and to the touch very dense. All general symptoms have completely disappeared, the animal being normal except for the enlarged thyroids, the one on the unoperated side still being the larger. We do not attempt, of course, to draw any conclusions as to the effect of the operation on goiter, from the *data* we have so far secured, but we considered this case interesting enough to warrant its description in some detail.[1]

In some cases the anastomosis may produce very dangerous effects. If, for instance, the central end of the abdominal aorta is united to the peripheral end of the vena cava, the circulation is immediately reversed in the lower part of the abdomen and the upper part of the inferior limbs, the valves stopping the blood from the lower portion of the latter for a time. By degrees, however, they give away, and at the same time the animal may present symptoms of a very abundant hemorrhage, even becoming comatose. If at this stage the head be lowered and the posterior limbs elevated, it immediately regains consciousness, as evidenced by its cries and the ambulatory movements of the fore limbs. Post-mortem examination of such a case shows an enormous congestion of the veins below the level of anastomoses, the animal dying apparently by hemorrhage of the red blood into the venous system.

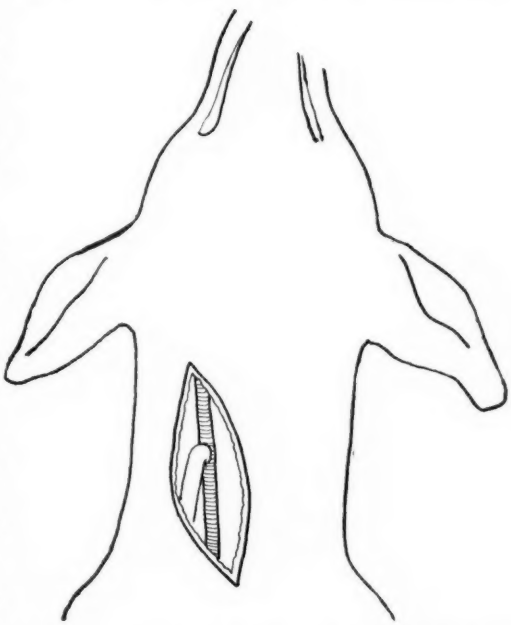

Fig. 12. Lateral implantation of the external jugular vein on the carotid artery.

After the operation the veins undergo rapid structural modification, seemingly of an adaptive character, in order to meet the imposed arterial functions. The wall becomes thickened, owing, probably, to the increaseof blood-pressure, for if the vein has numerous collat-

[1] Since writing this, microscopical examination of bits of the two glands has shown a striking difference, the operated gland being much more normal in structure, and containing far more colloid material.

erals, and consequently a relatively low blood-pressure, the thickening is less rapid and marked. In a case of anastomosis of the central end of the carotid to the peripheral end of the jugular, the specimen was taken five weeks after the operation. (Fig. 16.) From the anastomosis to the first collaterals the wall was thicker than the wall of the carotid artery. Between the first and the second collaterals the thickening was less marked. In the superior part of the neck, above numerous collaterals, the thickening was hardly apparent. (Fig. 17.) When the vein has no collaterals, or when the collaterals are ligated, the transformation of the wall is very rapid and marked. After a few weeks the thyroid vein becomes very similar in size to the thyroid artery.

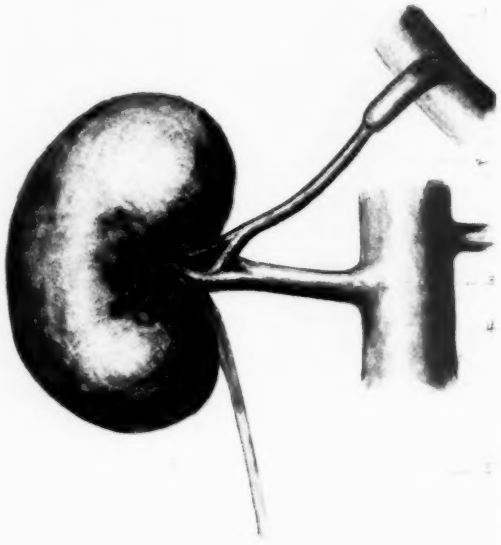

Fig. 13. Anastomosis of the peripheral end of the renal artery to the portal vein.

We do not yet know the permanent results of this operation. But as we have eight such operated animals in good condition, we hope to obtain conclusive evidence on this point. Seven months ago, one of the animals had the peripheral end of the external jugular vein united to the central end of the carotid artery. Now the circulation through the vein is apparently as active as it was on the day of the operation. In another case, where the jugular has numerous collaterals, there appears to be some dilatation of the main portion of the vessel and feeble pulsations can be detected in the jugular of the other side. In three cases of reversal of the circulation through a diseased thyroid gland the results seem to be permanent, even after several months. On no dog kept in the laboratory has obliteration of the vessels occurred, even after several months. At the present time we can only state that for seven months after the operation the veins have performed the main arterial functions, and that occlusion has not occurred.

It is our intention to keep these animals under close observation for a year or more, and then to remove and carefully study the specimens in order to settle the question of the anatomical changes.

### V. Biterminal Transplantation

As before stated, this operation consists of interposing a segment of vein between the two cut ends of an artery. It may be divided into (*a*) incomplete and (*b*) complete transplantation.

In the partial or *incomplete transplantation*, a segment of the vein accompanying the artery is substituted for the resected arterial segment. A typical example of this operation is the interposition of a segment of the femoral vein between the ends of the femoral artery. (Fig. 17.) A segment of the femoral artery in Scarpa's triangle is dissected and extirpated. On the vein a segment is chosen and isolated from the remaining portion of the vessel by means of two ligatures. Its two ends are dissected, in preparation for union to the ends of the artery, but all the middle part of the segment is allowed to retain its normal connections and collaterals, the latter becoming arterial after the circulation is changed. The venous segment should be longer than the resected portion of the artery, in order to avoid undue stretching in anastomosing its ends to the ends of the artery. Immediately after the union is completed, arterial circulation is established through the venous segment.

The *complete transplantation* consists of extirpating a portion of a vein and of putting

it between the cut ends of an artery. A segment of the external jugular vein, or of the internal saphenous vein, may be transplanted on the carotid or on the femoral arteries, respectively, in this way. (Fig. 18.) After having prepared the common carotid artery by dissection, and resection of a segment, the external or internal jugular vein is exposed, dissected, and a portion isolated between two ligatures. This portion is extirpated, and may be preserved outside the body for a few minutes by placing it in isotonic sodium chloride solution, or in vaseline, to prevent drying. On account of the retraction of the ends of the cut artery owing to its elasticity, the venous segment should be longer than the extirpated segment. The venous segment is then interposed between the ends of the artery, and anastomoses effected by end-to-end suturing, immediately after which circulation is re-established. If, instead of the jugular vein, the internal saphenous vein be used, owing to the presence of valves, it is necessary to reverse

Fig. 15. The thyroid vein and a segment of the internal jugular vein are transplanted on the central end of the carotid artery.

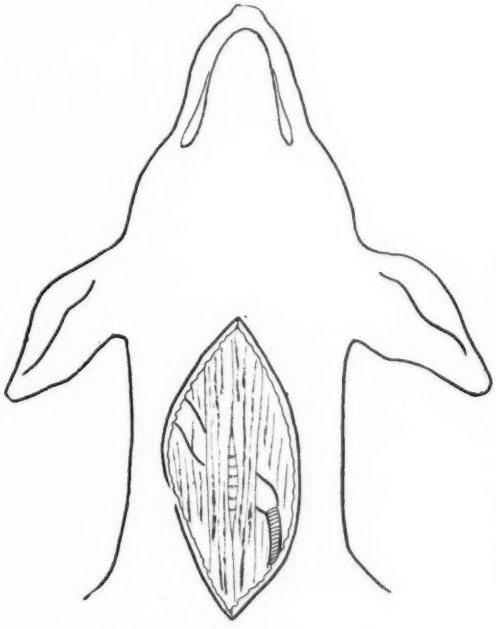

Fig. 14. Transplantation of the peripheral end of the right external jugular vein on the central end of the left carotid artery.

the ends of the segment before interposing it between the ends of the artery.

In addition, there is another variety of the complete transplantation of vein on artery. It may be called a *reparative transplantation*. It consists of taking a flap from the wall of a vein and putting it on an opening made through the wall of an artery.

Selecting a small dog, the left common carotid artery was exposed and a wound made in the anterior wall, the tissue for the space of about one centimeter longitudinally, and one-half the circumference of the vessel transversely, being removed. A flap of corresponding area was then removed from the external jugular vein and its edges carefully approximated to those of the artery surrounding the wound and the two sutured together. Particular care was exercised to have the endothelial layers smoothly joined. Slight hemorrhage occurring on re-establishment of the circulation was readily controlled by the in-

sertion of a few additional stitches. The venous flap or "patch" appeared to allow the circulatory functions to go on without hindrance. The animal is now alive, about two months after the operation, and the circulation in the vessel in good condition. Careful observations will be continued, in order to determine the permanency of the result.

The results of the incomplete and complete transplantations are very similar, and will therefore be described together.

On release of the hemostatic clamps, the red blood flows through the venous segment, and the circulation is re-established. The venous segment assumes an arterial hue, its size is usually larger than the diameter of the artery, the wall being distended under the influence of the blood-pressure. In all cases the venous segment has supported the increased pressure without any sign of rupturing, even when obtained from a relatively thin-walled vein, such as the internal jugular. Of course, the blood-pressure to which the venous wall is subjected in this operation is, as a rule, much greater than in uniterminal transplantations. But, excepting such slight hemorrages as sometimes occur immediately after the operation, due to longitudinal foldings of the wall when the vessels differ greatly in size, no dangerous hemorrhage has been observed.

In complete transplantations, hemorrhages may occur from the branches of the venous segment if they are not properly ligated before extirpation.

When the transplantation is incomplete, and if the venous segment has branches, arterial circulation through them is not, as a rule, immediately established. In a case of interposition of a segment of femoral vein between the cut ends of the femoral artery the segment had two collaterals, one of which supplied the adductor and the other the triceps groups of muscles. These veins remained filled with dark blood for some time after the circulation has been re-established in the distal portion of the artery through the interposed venous segment. After the arterial circulation was restored, a dilatation was observed near the origin of a small vein, below which the blood was dark and above which it was red. The lower end of the dilation marked the location of a valve. About two and a half hours later, the valve was observed to give way and the circulation became red throughout the main trunk of the small vessel (8).

Immediately after complete or incomplete venous transplantation and re-establishment of the circulation, the pulsations of the portion of the artery peripheral to the venous segment are somewhat modified, being weaker. In a case of interposition of a very long segment of jugular vein of large diameter, between the cut ends of the carotid artery, with excellent restoration of the circulation, the pulsations of the artery distal to the segment, immediately afterward, were almost imperceptible to the touch, while between the segment and the heart the pulsations were very strong. Tracings of the arterial blood-pressure and pulse distal and central to the venous segment showed marked differences in the case of the pulse, the distal tracings being the weaker, while the blood-pressure was the same in both cases. This effect in the pulse was due to the difference in elasticity of the venous segment and of the artery, and to the semicircular shape the segment assumed, owing to its great length. These observations were discontinued about two hours after the operation. In order to ascertain what changes take place in the circulation longer intervals after the operation, animals aseptically operated upon were studied. Their clinical examination showed that the circulation through the venous segment rapidly becomes modified. The changes of the pulse are easily observed. From the fourteenth to the twentieth day after operation, the pulsations become as strong in the peripheral end of the artery as in its central end. In one case, on the fourteenth day after the operation, blood-pressure and pulse-tracings taken from the artery distal and central to the segment, and recorded by a mercury manometer, revealed no difference in the former and only slight differences in the latter. It might therefore be concluded that the physiological differences in character of the arterial circulation distal and central to the venous segment present immediately after the operation are only temporary. This indicated the occurrence of adaptive anatomical changes in the segment, which direct examination showed to be the

case. This increase in strength of the pulsasations in the distal end of the artery is the only observed change undergone by the arterial circulation after the operation. After it occurs, the circulation through the venous segment

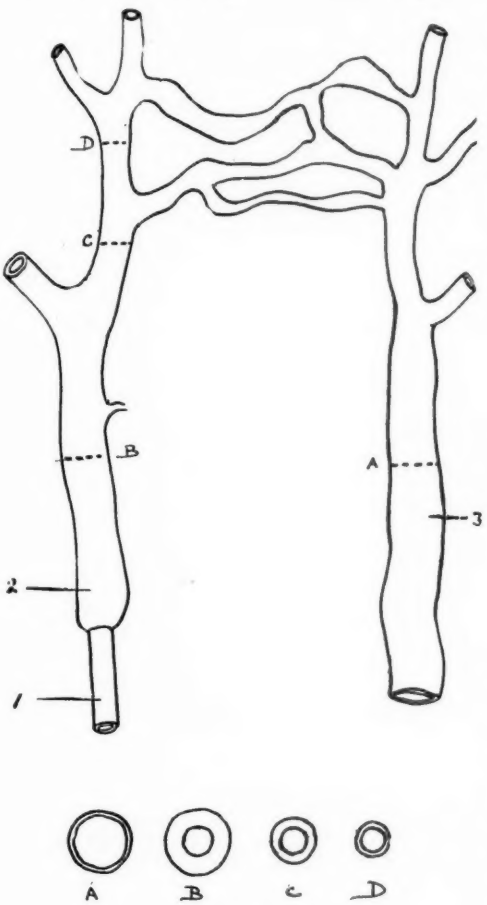


Fig. 16.

1. Right carotid artery.
2. Right external jugular vein.
3 Point of the section A.
4. Point of the section B.
5. Point of the section C.
6. Point of the section D.

A, B, C, D. Sections of the veins, showing the relative thickening of the wall.

appears the same in character as that through the other parts of the artery. In another case, fifteen days after the substitution of a segment of jugular vein for a resected portion of the carotid artery, it was possible, by taking the vessel between the fingers, to perceive that the diameter of the venous segment was greater than the diameter of the artery and to detect strong pulsations in it. By pressing the segment between the fingers, thickening of its walls was readily detected. This examination was greatly facilitated, owing to the fact that the dog had become very emaciated on account of an acute pulmonary affection. By frequent exploration it was possible to detect the progressive thickening of the wall. At the present time, about three months after the operation, the circulation through the venous segment appears to be perfect, and to palpation it exhibits the characters of an artery.

This experiment shows that a segment of vein, completely extirpated and transplanted

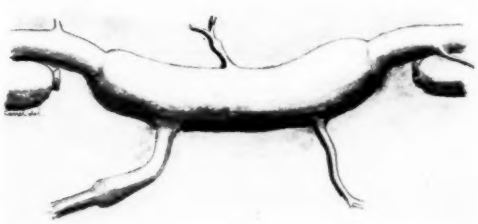

Fig. 17. Incomplete biterminal transplantation of a segment of vein on the femoral artery. Reversal of the circulation through the collaterals of the venous segment.

on an artery, receives sufficient nutrition to enable it to perform the main arterial functions, and that thrombosis does not occur. All similar operations have been successful, and they have demonstrated that a vein is able to assume the main arterial functions. But, as we think that this method may be used on man in the treatment of large wounds of arteries, aneurisms, etc., we consider it necessary to determine carefully the permanent effects of the arterial blood-pressure on the venous wall. It is not sufficient to know that a vein, after having been transplanted on the arterial apparatus, is able adequately to support the arterial blood-pressure and to exhibit arterial phenomena. It is important to determine if the segment of vein acquires all the characteristics of an artery. It is well known, indeed,

that the function and the development of an organ are intimately associated, and that even in adult animals an organ or tissue may be caused to undergo extensive anatomical and physiological changes. It may be assumed, therefore, that a vein acquiring the function of an artery would become arterial in all its essential characters. But theoretical considerations never deserve absolute confidence, and we must rely implicitly on experimental results only when a point possibly involving the life of a human being is concerned.

The changes in the wall of the venous segment begin probably very soon after the operation, but for some days they cannot be detected clinically or macroscopically. On the sixth day after the incomplete transplantation of a segment of femoral vein between cut ends of the femoral artery, the wall appeared normal in size and structure. The endothelium was normal and the lines of union were smooth, but partly concealed by an extremely thin flesh-colored ring. This appeared to be a sheath of organized fibrine of about the same thickness as a thin cigarette-paper. On a dog examined fourteen days after the operation, profound changes in the character of the blood-vessel were observed. The segment appeared as a dilated portion of the carotid artery. The line of union was concealed by a thin sheath of connective tissue. The external diameter of the venous segment was about twice as large as that of the artery. In hue it appeared the same as the artery. Surrounding it was a sheath of loose connective tissue, similar to the external sheath of the artery. The lumen of the venous segment and of the artery were exposed by a longitudinal incision. The endothelium was apparently normal, being white and glistening. The lines of union of blood-vessels were covered by sound endothelium. The union appeared perfect (Fig. 19), excepting possibly at a very small point, where a minute patch of fibrine was very tightly adherent to the wall. After being cut, the segment remained open like an artery. The wall appeared almost three times as thick as the wall of the artery. (Figs. 20, 21.) At the point of the anastomosis the wall of the vein was approximately of the same thickness as the wall of the artery; being 1.19 mm. From this point it increased in thickness, to about 2.88 mm. This shows, then, that the wall of the vein was enormously thickened. (Fig. 22.) Microscopical examination showed the fibrous layer of the middle coat and the inner fibrous layer of the outer coat to be principally involved, the latter being enormously thickened. The thickening of the middle coat is partially explained by the increase of the fibrous tissue, seemingly of the elastic variety.

It may be concluded, therefore, that, from an anatomical standpoint, the vein quickly undergoes anatomical changes and has a tendency to assume the characters of an artery, but the question is as yet far from settled. The microscopical examination of the vessel must be performed a longer time after the operation, one year or more, for instance. A dog on which, three months ago, a segment of jugular vein was subtituted for a resected portion of the carotid artery, will enable us, probably, to make observations after such a period.

But we can conclude, at the present time, that a transplanted venous segment is able to perform the principal functions of an artery.

### VI. Biterminal Transplantation of a Tube of Peritoneum on an Artery

The attempt was made to substitute a tube made from a flap of peritoneum for a segment of artery.

This operation was performed by cutting out a rectangular flap of the peritoneum of the anterior abdominal wall. In two cases the flap was composed of the peritoneum and a portion of the transversalis muscles, the direction of the fibers of the muscles being at right angles to the long axis of the flap, i. e., circularly disposed in the completed tube. In the third case, the peritoneum and the subperitoneal fascia only were taken. In each case the flap was in the shape of a very long rectangle, so that by suturing together the longer edges a tube was obtained. The suturing was accomplished by perforating silk stitches. Great care was taken not to include pieces of muscle or cellular tissue in the stitches. The peritoneal surfaces were united as accurately as possible, but in none of the cases was the suturing thoroughly satisfactory, on account,

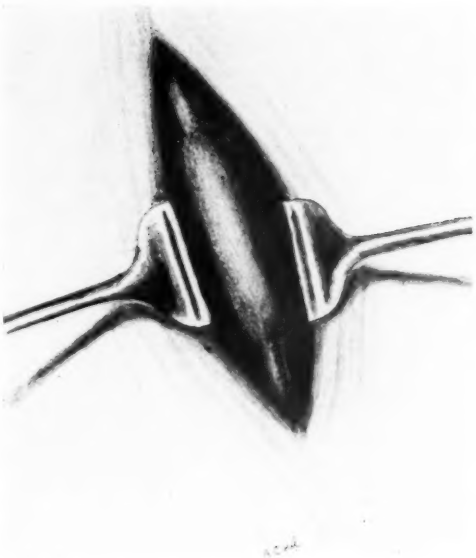

Fig. 18. Complete biterminal transplantation of a segment of external jugular vein on the carotid artery.

mainly, of imperfect cutting of the flap and the approximation of the peritoneal surfaces. The tube was placed for a few minutes in an isotonic solution of sodium chloride. Then the common carotid artery having been exposed, a portion of it was resected and the peritoneal tube interposed between, and anastomosed to its cut ends by end-to-end suturing. The circulation was immediately re-established in the peripheral end of the artery, through the peritoneal segment. But in each case hemorrhage immediately occurred along the longitudinal line of suturing, and at the point of union of the longitudinal suture and of the circular anastomoses, being most abundant at the latter point. These hemorrhages were controlled by additional stitches, after which the circulation was satisfactory.

In the first case the interposed segment had too large a diameter, and it appeared as an enormous vascular bag interposed between the ends of the artery. In the second case it was so long and so narrow that circulation through it was greatly hindered. In the third case the tube was of about the same size as the external jugular vein, and the circulation through it was established very satisfactorily.

Eight days after the operation the dogs were etherized and the vessels examined and found to be occluded. In the two first cases some infection of the wound and an obliteration by thrombosis of the peritoneal segment and of the carotid artery had occurred. The character of the clot showed that this obliteration probably occurred a few hours after the operation.

In the third case there was no infection of the wound, but thrombosis of the vessel and segment. At each end of the peritoneal segment was found a fibrous clot, completely obliterating the lumen at the anastomosis. These clots were small and firmly adherent to the wall of the vessel. The point of adherence corresponded exactly to the point where the longitudinal suture of the flap and of the circular suture of the anastomosis met.

Fig. 19. Shows smoothness of endothelium in biterminal venous transplantation. (Jugular veins on carotid artery.)

(Fig. 23.) The endothelium of the artery a short distance from the anastomosis appeared normal. Close to the anastomosis it was a little reddened. The nutrition of the wall of the peritoneal segment appeared satisfactory. The segment was filled with coagulated blood, not adherent to the peritoneal surface, excepting at the points of suture. It seems probable, therefore, that for several days the tube served the functions of an artery and that the obliteration was progressive. Of course this is merely hypothetical.

Though these three experiments were unsatisfactory from a practical standpoint, we cannot conclude that a tube of peritoneum is unable to carry blood without the occurrence of thrombosis. Even though this result may seem probable, other experiments are necessary to determine the points, as both the technique and asepsis were imperfect. Analysis of the third experiment shows that thrombosis occurred at the point of anastomosis. As it probably began where the clot was found tightly adherent to the wall, which corresponded to this point, and that as it was not adherent to the peritoneal surface, it is possible that thrombosis was due to the imperfect approximation of the endothelium surface. We do not, however, consider this argument of great value. By performing new experiments with an improved technique we hope to be able to draw definite conclusions.

### VIII. Surgical Applications of Venous Transplantations

At this point we conclude the discussion of the experimental facts, and will indulge briefly in hypotheses. The uniterminal and biterminal venous transplantations are yet in the preliminary stage of their history. It is impossible to state if this history will be short or long, or if this operation will or will not have clinical applications. From a purely hypothetical point of view, these applications are numerous, but we know that hypotheses are easy to build, even when their realization is impossible.

It is always a delicate thing to adapt the results of experiments to clinical purposes. It would be a mistake to believe that the results obtained on lower animals will be similar on man. Such experiments, even though brilliantly successful, do not warrant the drawing of definite conclusions as to their adaptability to human therapeutics. Progress of surgery increasingly depends on principles elaborated in laboratories, especially in physiological laboratories. But new methods, before being used on man must be very severely tested.

All our experiments were made on dogs. The results were very satisfactory. But it would be bold to affirm that the same results are possible on man. The conditions are different as regards the vessels, the blood, and the general conditions of the patient. The vessels of man are less elastic and more friable than those of the dog. The blood differs somewhat in composition and coagulability. As these differences are relatively slight, it is reasonable to suppose that good results would be obtained if it were possible to operate always on sound young individuals. But these operations are often indicated on patients in whom the tissues are pathological. In such cases the results would be uncertain. We know that veins may be readily transplanted when the tissues are normal. But we do not know what would happen if the vessels were sclerotic, and if the general conditions of the patient were lowered by some diathesis.

These and similar questions can be answered, not by argument, but by experimental facts only. By operating in such cases as appear to justify the risk, sufficient data may be obtained as to render possible conclusions as to what results are to be expected in any given condition. Then only will it be possible to state whether or not these methods have any clinical value.

These practical applications — if they are found to exist — would require the same conditions for success as in experimental operations, viz., a precise technique and a rigid asepsis. It would be dangerous to attempt the transplantation of veins without meeting these conditions. Surgery of the blood-vessels is, we believe, quite free from accident if properly performed. But a fault of technique or asepsis would render it very dangerous, since complications, such as thrombosis, embolism, gangrene, and even secondary hemorrhage, might occur.

The theoretical applications of *uniterminal venous transplantations* are numerous. Many of them are so evident that they do not need to be enumerated at length. The transplantation of a vein on another vein, for instance, might be performed in order to produce a deviation of the blood from one part of the venous system into another. In cirrhosis of the liver, when there is a hypercongestion of the portal veins, it would be possible to transplant one end of a lumbar vein or of some other vein onto the splenic vein or some other branch of the portal system. It might give better results than Talma's operation, and certainly it would be less dangerous than the establishment of Eck's fistula. It is known that this operation was made on man by a French surgeon, Vidal de Perigueux, in 1903 (9). The patient died after a few months with symptoms of endovenous infection. It is very doubtful if it would be justifiable to perform this operation again on man.

A consideration of the applications of the transplantations of veins on arteries is more interesting.

The different varieties of transplantations and anastomotical combinations of the vessels of the neck are able to effect marked changes in the blood-pressure of the intracranial vessels. The implantation of the central end of the external jugular vein on the wall of the carotid artery, for instance, causes a diminished blood-pressure in this artery. It would not be entirely impossible perhaps to use similar operations in cases where a modification of the blood-pressure in the vascular apparatus of the brain is indicated.

In certain exceptional cases of unoperable arterial aneurysm of the internal carotid, the present treatment is the ligation of the vessel. But this ligation may cause the death of the patient, if one of the branches of the circle of Willis is obliterated, as may result, as has been shown by several observations. Perhaps it would not be impossible to stop or to retard the evolution of the aneurysm by an arteriovenous anastomosis ; for it is well known that the arteriovenous aneurysms have a less active evolution than the arterial ones. This relatively benign character of the evolution is thought to be due to the low pressure of the blood, owing to the

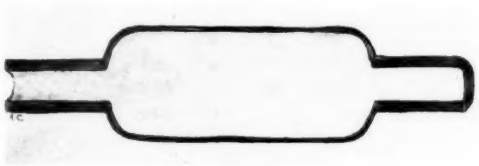

Fig. 20. Interposition of a venous segment between the ends of an artery.

communication of the artery with a vein. Consequently, then, if an artificial communication of the carotid artery and of a large vein be established between the aneurysm and the heart, the evolution of this aneurysm would probably be checked, owing to the lowering of the blood-pressure. But it is probable that, in such a condition, a better and simpler procedure will be the progressive obliteration of the carotid artery, for which Halsted has described an ingenious method.

Our experiments have shown that the reversal of the circulation through the thyroid gland may be brought about by transplanting one or two of the thyroid veins onto the carotid artery, and one of the thyroid arteries onto the jugular vein, and ligating the other vessels. The purpose of this operation was to produce an increase of the arterial blood to the gland. This modification of the circulation is easily brought about, as the caliber of the veins of a gland is always much larger than the caliber of the arteries, and it is probable, though unproven, that the amount of blood flowing through the gland will be increased. This change of the circulation may, by producing modifications in the metabolism of the gland, be of value in the treatment of certain affections. It is not necessary, how-

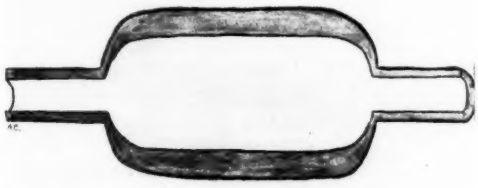

Fig. 21. Thickening of the wall, 14 days after the operation.

ever, to reverse completely the circulation through a diseased gland in order to produce distinct macroscopical modifications. The simple transplantation of one large thyroid vein on the carotid artery produces very marked change in a goiterous thyroid gland. It is not wholly unreasonable to suppose that by this kind of operation it may be possible to re-establish the functions of such a gland or to enable it to recover from acute or chronic disorders. It is well known that the circulation of the kidney or the thyroid gland, for instance, is modified by the section of the nerves which surround the arteries. In the transplantation or replantations of organs or limbs, exaggeration of the circulation, due doubtlessly to the section of the vasomotor nerves, was observed. This hyperemia, in itself, may lead to changes in the metabolic processes of the tissues.

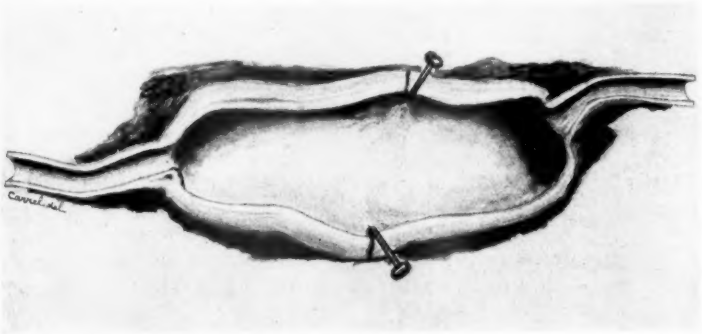

Fig. 22. Segment of external jugular vein interposed between the ends of the carotid artery, 14 days after the operation.

We do not know if this attempt to modify the metabolism of an organ by acting on its circulation, directly or through the nerves, will or will not produce good results, as these experiments are in their preliminary stage. Present surgical methods of treating diseased glands are empirical. They consist mainly of cutting or extirpating the organ. It is to be hoped that the application of physiological methods may lead to more rational therapeutics; e. g., influencing the nutrition of an organ and its pathological processes by operating on its vessels or nerves.

The possibility of transforming a vein into an artery, from a functional point of view, naturally arouses the idea of substituting veins for arteries when the latter are rendered useless by some pathological processes. For instance, if it were possible in sclerosis of the cerebral arteries (cerebro-sclerosis) to transmit the arterial blood to the brain through the veins, it might be of some value therapeutically. On dog, the reversal of the circulation through the internal jugular vein does not produce any clinical trouble, but it might not be the same on man, as in the latter the internal jugular vein is more important than in the former. This idea of using the veins to conduct the red blood to the brain is not a new one. Jaboulay[1] expressed, in 1902, the opinion that this arterio-venous anastomosis might have a good result in case of insufficient circulation, as in softening of the brain. Such results may not be impossible, but they seem improbable. Besides, the reversal of the circulation through the internal jugular vein would have but little influence on the circulation of the brain, owing to the collateral circulation. For this purpose it would probably be necessary to act directly on the cerebral vessels, as by transplanting the central end of the superficial temporal artery onto the peripheral end of the Sylvian vein.

Since our experiments (11, 12) have shown that the reversal of the circulation in a limb is possible by anastomosing the central end of the main artery to the peripheral end of

[1] In discussion following the presentation before the Société nationale de médicine de Lyon of a dog with arterio-venous anastomosis operated on by Carrel and Morel. See Bibliography, 4.

the main vein, it must be determined whether or not this operation can be employed to prevent gangrene in case of obliteralion of the arteries of a limb. The experiments demonstrate that on a normal limb the reversal of the circulation may be effected in the course of a few hours. But we do not know what would happen if the arteries were obliterated, as, for example, by the injection of paraffine. Would the nutrition of the limb be satisfactory? It is not probable. This idea of using the veins as arteries in gangrene of a limb is not new. It was suggested by San Martin y Satrustegui in 1902 (13). He attempted to establish a lateral anastomosis between the femoral artery and vein. Obliteration of the obviously being insufficient to produce reversal of the circulation in the limb. Besides, we have no reason to believe that the nutrition of the limb would be satisfactory after the reversal of the circulation, if the arteries were obliterated.

*The biterminal transplantation* may be used in order to re-establish the circulation through the peripheral end of an artery of which the continuity has been interrupted by an accidental or surgical traumatism.

Severe subcutaneous wounds of the large arteries are ordinarily followed by serious complications, gangrene often occurring. In such cases it would be possible to extirpate freely all the injured portions of the vessel and to re-establish the circulation by interposing a

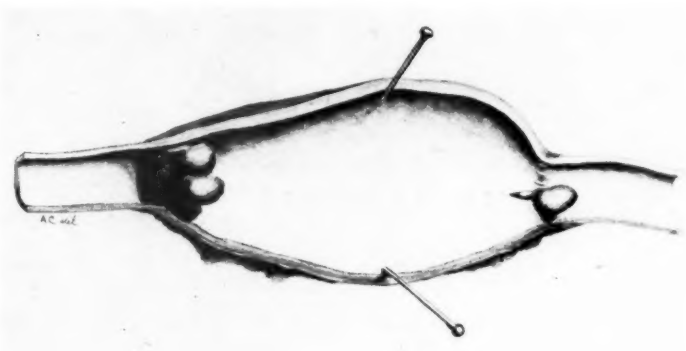

Fig. 23. A tube of peritoneum interposed between the ends of the carotid artery Obliteration of the anastomosis by fibrous clots removed and specimen drawn eight days after the operation.

vessels occurred on three goats which he thus operated upon. Also, he performed the operation on two patients affected with gangrene of the lower limb. In one case the operation was entirely unsuccessful. In the other, the gangrene stopped, but this was probably due to the fact that the affected portion was amputated at the time the anastomosis was made. Afterwards, Professor Jaboulay (14) established a lateral anastomosis of the femoral vein and artery on a patient suffering from gangrene produced by endarteritis. The operation was not successful, and amputation became necessary. The idea of San Martin y Satrustegui and Jaboulay was very ingenious, but their method was irrational, lateral anastomosis segment of vein between the cut ends of the artery. The same operation would be indicated when, during the extirpation of a large growth, the resection of an important vessel is necessary; e. g., sarcoma in the femoral region. But in the case of open wounds of arteries, it is better, probably, to make a simple ligation, and not to attempt transplantation, on account of the risk of infection.

In the treatment of aneurysms, the ideal method would be to extirpate the sac and to restore immediately the continuity of the artery. Unfortunately, it is practically impossible to unite directly the ends of the artery, on account of the gap that the resection of the sac produces between them. Other methods,

however, such as Matas's operation (15), yield good results. His brilliant method of inversion and suture of the sac is a great addition to the therapeutics of aneurysm. But in some cases, where the collateral circulation is poor, it might be well to establish immediately a direct circulation by removing the aneurysm and interposing a venous segment between the cut ends of the artery. Complete or incomplete transplantation may be used. The incomplete transplantation is simpler, and should be performed when possible.

## VIII. Conclusions

1. Uniterminal and biterminal transplantations of veins on arteries produce, from a functional point of view, the transformation of veins into arteries.

2. Transplanted veins adapt themselves to the new functions imposed.

3. Arterio-venous anastomoses adequately transmit the blood indefinitely. After seven months the circulation through the anastomosis is apparently as active as on the day of the operation.

4. Clinically, the transplantation of veins may have applications.

## BIBLIOGRAPHY


1. Carrel. La technique operatoire des anatomoses vasculaires et la transplantation des viscerès. Lyon médical, 1902.
2. Carrel. Les anastomoses vasculaires, leur technique opératoire et leurs indications. 2e congrès des médicines de langue française de l'Amérique du Nord, 1904.
3. Carrel et Morel. Anastomose bont à bont de la jugulaire et de la carotide interne. Lyon médical, 1902, vol. xcix, p. 114.
4. Carrel et Morel. Presentation d'un chien porteur d'une anastomose arterio veineuse. Lyon médical, 1902, vol. xcix, p. 153.
5. Exner. Einige Thierversuche über Vereinigung und Transplantation von Blutgefässen. Wiener Klin. Wochen., 1903, No. 10.
6. Hopfner. (See article of Payr, *infra*.)
7. Payr. Zur Frage der circulären Vereinigungen von Blutgefässen mit resärbibaren Prothesen. Arch. f. Klin. Chir., 1903, p. 32.
8 Carrel. Anastomosis and Transplantation of Blood-vessels. American Medicine, 1905.
9. Vidal. Treatment chirurgical des ascites. 16e congrès français de Chirurgie, 1903. Presse médicale, 1903, p. 747.
10. Halsted. The Partial Occlusion of Blood-vessels, especially of the Abdominal Aorta. Bulletin of the Johns Hopkins Hospital, 1905, p. 346.
11. Carrel and Guthrie. The Reversal of the Circulation in a Limb. Annals of Surgery, 1906.
12. Carrel et Guthrie. La reversion de la circulation dans les veines valvulées. Comptes rendus de la Société de biologie. Paris, 1905.
13. San Martin y Satrustegui. La chirurgie de l'appareil circulatoire Semaine médicale, 1902.
14. Jaboulay. Chirurgie des arterès. Les applications à quelques lésions de l'arterè fémorale. Semaine médicale, 1902, p. 405.
15. Matas. An Operation for the Radical Cure of Aneurism, Based upon Arteriorrhaphy. Annals of Surgery, 1903.

# PRE-OPERATIVE THROMBI IN THE REGION OF THE FIELD OF OPERATION AS A CAUSE OF POST-OPERATIVE COMPLICATION AND DEATH[1]

By A. W. ABBOTT, M.D., Minneapolis, Minn.

I CANNOT find that this subject has ever been brought before this Association, but believe that it is of sufficient importance to command our attention.

The pathology of thrombosis, the dangers from resulting embolism, metastatic abscess, septicæmia, pyæmia, and secondary hemorrhage have been carefully studied since the time of Virchow, and are thoroughly appreciated by the profession.

This paper will discuss only those thrombi which already exist in the immediate neighborhood of an operation. I shall take the liberty of redirecting your attention to some well-established conclusions which bear directly upon my subject.

Thoma states that " there are infective diseases which frequently cause thrombosis, in the absence of other morbid processes; the infective thrombus may therefore be regarded as a well-marked and frequently occurring form. Among these may be especially mentioned suppurations in the neighborhood, which more or less involve the walls of the arteries and veins."

" If suppuration makes its way to the vessel-wall from without, and this leads to purulent infiltration, a thrombus forms in the lumen of the vessel. This is then infected from without, and undergoes puriform softening This also occurs if suppuration develops in an already thrombosed vessel. " As a rule, this form of thrombus is infiltrated with micro-organisms, so that it becomes an important means of general infection."

Virchow, in 1855, demonstrated that " when the vessel-wall is inflamed it may suppurate, or even abscesses form, which cause the outer wall to bulge on both sides without any coagulation of the blood ensuing in the cavity of the vessel. At other times, phlebitis is the cause of thrombosis, in consequence of the formation of irregularities and even ulcerations upon the inner wall."

From the above we learn (and this may be corroborated by any surgeon if he will carefully observe) that thrombophlebitis is common in inflamed areas; that if the vessel-wall is inflamed the vessel may or may not be thrombosed; and that in either case it is a source of great danger.

I would add that thromboses are common after extensive contusions and lacerations of the soft parts. In deep phlegmonous inflammation it is the rule that deep incisions produce only the slightest bleeding. The infected vessels are not only thrombosed, but compressed by the tissue tension.

We may also bear in mind that in inflamed areas the tissues are more or less fixed; the vessels are not readily pushed out of the way, and are not easily discovered. The vessels are likely, therefore, to be cut or torn, or violently disturbed. A vessel in which there is a clot is more likely to become infected during an operation, than one whose lumen is open, because if the thrombosed vessel is open it remains open, and hence exposed to germ invasion, while the sound vessel bleeds, washes away infective material, and is immediately closed by the surgeon.

The only distinguishing symptom of thrombosis in regions where operations are likely to be performed is œdema, and as there is no œdema where the collateral circulation is abundant, it follows that only in the extremities, especially the lower, may this symptom be of service in diagnosis. Pain is obscured by the pain of the growth or causative inflammation.

Dilation of the collateral veins is usually present, but usually of no diagnostic advantage, as these vessels are ordinarily not superficial.

My attention was first directly called to this condition in 1880. In repairing a laceration of the perineum, I cut open several thrombosed

[1] Read before the Western Surgical and Gynecological Association, Kansas City, Missouri, December 28-29, 1905.

veins, some of them an eighth of an inch in diameter. My technique was not as aseptic as it should have been, and no further attention was given to the thrombi. The wound was not perceptibly infected, but the patient died in forty-eight hours, of well-marked septicæmia. Since that time I have seen several cases where vessels of considerable size, in the field of operation, were thrombosed — the thoracic veins, the deep epigastric veins in large appendiceal abscesses, and many times thromboses in the lacerated perineum. Thrombi are common in the lateral sinus from mastoid disease, are often seen in the broad ligaments, and more commonly than elsewhere in the infected uterine walls.

Traumatism, malignant disease, and tuberculosis may cause thrombosis in the renal veins. Thrombosis of the mesenteric veins, especially the superior, with extension to the portal vein, follows volvulus, ulcer, cancer, and other diseases of the bowels. Portal thrombosis follows gastric ulcer, cancer, blows on the abdomen, and intestinal disease. The deep epigastric veins are often thrombosed in appendicitis. In 131 cases of appendicitis, Dr. Halsted reports four cases of thrombosis of the femoral veins. The iliac veins are also sometimes involved.

The dangers of thrombosis following operations have been well studied and are appreciated by the medical profession, but with the exception of thrombi of the cerebral sinuses in connection with ear suppurations which have been thoroughly worked out by the aural surgeons, I believe that too little attention has been given to thrombus which may be disturbed or infected by operations or may materially affect the prognosis of the operation.

We all recognize the risk of embolism, especially pulmonary, of infection of the clot, of blood infection from the organisms in the clot. How far does this knowledge affect our methods? and are there any practical ways of lessening the dangers incident to the condition?—are questions of importance. I believe that many cases of fatal sepsis, pulmonary embolism, and particularly many cases of so-called ether pneumonia, can be rightly ascribed to the infection of a clotted vein or its disturbance by rough handling, or both, that are otherwise inexplicable; so, also, pyæmia, abscess of the liver, osteomyelitis, and other evidences of metastatic infection.

If these damages are real, how can we avoid or minimize them? Aural surgeons have formulated a definite operation for thrombi of the lateral and sigmoid sinuses; viz., ligation of the internal jugular vein and clearance and drainage of the sinuses.

This is an eminently successful operation, considering the desperate condition which calls for the interference, and is, as far as I know, the only established operation for thrombosis complicating operations.

I believe that a similar course should be pursued, as far as possible, in all operations complicated by thrombosis. Unfortunately, the existence of complicating thrombus is not, as a rule, as easily discovered in other operations. In the gastric and hepatic regions the thrombosed veins are likely to be hidden by adhesions, or by the organs themselves. In kidneys requiring operations, the vessels are the last tissues to come in view and touch. In appendicitis, the mesenteric veins are often in forbidden territory, on account of the fear of the dissemination of septic material; for the same reason the iliac veins are not likely to be touched or sought. The deep epigastric veins are only to be felt or seen by wider dissection than is customary. Thromboses after lacerations and contusions are generally deeply out of sight in the tissues. However, like other abnormal conditions, we shall detect them with a frequency in proportion to the intelligent search we may institute for them.

In operations for new growths, obstructive conditions, perforations, and wounds in the abdominal cavity, thrombosis may be more readily detected; so, also, in the pelvic veins and perineum.

The rule may be laid down, that, in cases where the collateral circulation is adequate, the thrombosed veins should be excised or ligated centrally. Long ago, Baumgarten proved that if a medium-sized vessel is carefully ligatured the blood-stream is brought to a standstill as far as the nearest collateral branch, but no thrombus is formed unless the intima is ruptured. If the collateral supply is inadequate, resect, if possible, the necrosed

tissues with the thrombosed vessels which supply or drain it.

If the conditions are such that these methods cannot be adopted, let the vessels alone, especially by disturbing as little as possible the tissues in their vicinity. Forcing the clot out of its bed and infecting the clot by cut or puncture afford the great danger from rough and incautious treatment of the neighboring tissues. In some cases this condition would be a valid argument against the too early getting up of a patient after operation.

In following out these rules, the results have been satisfactory in the majority of cases, while in some, the outcome has not been all that could be desired. It is also to be taken into consideration that a recovery following the excision or ligation of thrombosed veins is not always a demonstration that recovery would not have taken place without the intervention. Nevertheless, from the fact that in one case of appendiceal abscess I was able to trace a general infection directly to a puriform thrombophlebitis of the right deep epigastric vein, and in the case cited above to the thrombi in the perineum, and also in one case of appendicitis, in which I made the prognosis of a fatal result from septic embolic pneumonia, there being pus in the deep epigastric vein, it is fair to presume that recovery was assisted in other cases by the precautions taken in this regard. Of couse, where necrosed tissue has been excised along with the thrombosed vessel, as, for instance, in the bowel, the credit for the recovery should undoubtedly be given to the intervention.

It is evident from our journals that thromboses are lately receiving more attention than formerly. Elliott, in November, 1905, *Annals of Surgery*, reports five successful excisions for mesenteric thrombus. Monro, in the same number, calls attention to subphrenic and hepatic abscess, due in some cases to mesenteric thrombus following appendicitis.

The intention of this paper is to go back one step further, and inquire whether we may not, by early operations, by special care in handling of the tissues, by excision or ligation, prevent, in some measure, these very conditions which call for desperate intervention or result in death.

In certain cases there may be some satisfaction, if we recognize, during operation, a puriform thrombophlebitis that we cannot control, and that must inevitably prove fatal, in preparing the friends for the event, as well as in taking the onus from the operation itself.

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# CARCINOMA OF DESCENDING COLON[1]

By W. W. GRANT, M. D., Denver, Colorado

ABOUT half of all intestinal cancers occur in the rectum. The next in order of frequency are sigmoid and descending colon, cæcum, and duodenum.

Cancer of the stomach is much more common than that of the intestines, or any other portion of the alimentary canal. Its progress is more rapid in the stomach. It is much more common in men than in women, and is not common under thirty years of age. In colon, it is usually primary and circumscribed. Nodules and metastases produce stenosis, but both are late occurrences.

Chronic indigestion, with spells of diarrhœa, and mucous and bloody discharges, are suspicious indications. Distention with such symptoms is a late occurrence, and usually indicates constriction. Palpation of colon will usually reveal a tumor when abdomen is flat. Ulceration sometimes occurs early, but not so common as in the rectum. Carcinoma of hepatic or splenic flexure of colon may be easily mistaken for some affection of the corresponding kidney. This is illustrated in the case to be considered. Mikulicz says it may exist several years without producing alarming symptoms, or seriously

[1] Read before the Western Surgical and Gynecological Association, Kansas City, Missouri, December 29, 1905.

affecting the health. This point the case also confirms. It is less malignant than the same disease of the rectum. It is not very painful until late, when inflammatory adhesions, usually to the peritoneum, produce acute pain.

Stenosis of the large bowel is not attended with striking or acute symptoms until obstruction is complete. In the small intestine, or in the cæcum, because of its proximity to the ileum, there is intestinal contraction and violent peristalsis above constriction. Moderate constriction is not recognized by clinical symptoms. The constriction is due to intrinsic and extrinsic causes. Growths of intestines and muscular spasms are chief factors in the former, while tumors outside, adhesions, and kink are chief factors without. The duration of carcinoma of the colon, undisturbed by operation, is from two to six years.

Mild malignancy and late metastases, being the rule, favor radical operation, but the earlier it is performed, the greater the prospect of permanent relief.

The following case has some features of interest: Mrs. J. B. D., aged 44, married, and has three children, the youngest 12. For six years a tumor had been observed, located near anterior iliac crest, which five or six different physicians and surgeons, before coming to Denver, had diagnosed as a wandering kidney. Two years before, in September, 1905, she fell, by tripping, prone on sidewalk. From that date, she stated, the tumor became more fixed, being before that quite movable. She commenced, also, to suffer pain in and about it. Finally, in order to improve her general health, she was sent to Colorado last fall, and was placed in charge of Dr. J. N. Vroom. Very early in October, 1904, she commenced to suffer from manifest indications of obstruction. On the evening of October 6th, I was asked by Dr. Vroom to see the patient with him. Efforts to evacuate the bowels had failed for past 24 hours. She had vomited slightly once or twice in the mean time. The abdomen, though not extremely distended, was sufficient to prevent a satisfactory examination of the growth by palpation, and it was too high to determine anything by rectal or vaginal examination. Rectal tube was arrested in upper part of sigmoid, and water injected returned by the tube as fast as introduced. Obstruction was complete, and even if not, colostomy was indicated, and I advised immediate operation. Cases of obstruction of colon have been reported, by adhesion constriction, from a moving kidney and spleen with long pedicles. The history in this case indicated long-standing tumor, probably malignant. Awaiting husband's approval and arrival, the operation was unavoidably delayed. The patient grew gradually worse, and Saturday morning, October 8th, she was vomiting fæcal matter. Abdomen was enormously distended, and condition extremely grave, yet patient and husband both desired the last effort to save or prolong life. She was put on the operating-table as quickly as possible, and with Dr. Vroom, and assistance of internes at Mercy Hospital, I performed the operation of typhlotomy, believing this preferable to operating at the site of the obstruction. The pressure was so great from distention that it was difficult to keep the omentum out of the field of operation, and the intestinal wall so thin from some cause that gas escaped from an occasional needle-puncture in stitching the gut to the abdominal peritoneum, which was done with great care to prevent fæcal extravasation. The gut was now incised and a rubber tube inserted. A great quantity of gas and fæces were evacuated, and the intestines were then thoroughly irrigated with normal salt solution. The abdomen collapsed immediately and the tumor examined more carefully. It was movable, in a limited circle, with a fixed point beneath, and was believed to be carcinoma of descending colon, just above the sigmoid. Vomiting ceased at once, and the patient recovered immediately from the effects of the operation, though in shock for eight hours. She was treated on the operating-table and afterwards by subdermic normal salt solutions with adrenaline and strychnine. No peritonitis or temperature followed, and she improved daily until the eighth day, when pain above the tumor from peritoneal adhesions commenced, which required sedatives to allay. It was my purpose to delay a second operation until the general condition improved sufficiently to give hope of a more satisfactory result; but the increased pain and activity at the site of the tumor showed

that nothing was to be gained by delay, so, at the husband's request, and with her distinct approval, though nothing favorable was promised, I operated for the extirpation of the growth on October 27th, three weeks from the date of the colostomy. I made an oblique incision about eight inches long, just above iliac crest, from the left hypogastrium to the lumbar region. Adhesions were extensive to the abdominal peritoneum, and it was stripped off with the tumor, which was delivered externally. There was an adhesion kink at the upper part from a coil of the colon, which was doubtless instrumental in causing the acute ileus, though the growth had encroached greatly on the lumen of the bowel. Clamps were applied and the gut severed above and below and a large Murphy button inserted. It was examined by Dr. W. C. Mitchell and pronounced carcinoma. The patient recovered promptly from the operation, though considerable temperature followed for a few days and then subsided. Pain ceased, no peritonitis followed, and abdomen remained flat. Rubber drain-tubes were inserted from lumbar wound. Bowels were moved through the artificial anus in the cæcum easily. The abdominal wound healed by primary union throughout its entire extent, except at the site of the drainage-tube in the loin. There was a little fæcal leakage from the tube, which doubtless came from imperfect union at the mesenteric side of the button, although fortified by a running stitch over the button. She suffered no more from pain at the site of operation, but in ten days commenced to suffer a great deal from pain at the pit of the stomach, which necessitated morphine. This interfered greatly with nutrition. Whether the pain was due to metastasis I do not know. No tumor could be felt. Emaciation continued, and she died on December 2d, five weeks from date of second operation, from general carcinomatosis.

The first operation, though the patient was in extremis, was an absolute and urgent necessity, and the result was exceedingly gratifying. Was the second advisable? Without much thought or consideration, this would generally be answered in the negative, in view of the advanced malignant character of the disease; yet, probably influenced some by the result of the first, it was desired by the patient and husband. The severe constant pain was completely relieved and life little, if at all, shortened. The slow growth of the disease, the absence of extreme virulence and pain, differing in these respects from the same disease in other localities, also the late metastasis, demand radical operation for its cure — the earlier, the better. The mortality steadily diminishes under thorough extirpation. The radical operation should not be done during an attack of acute obstruction. Colostomy should be done, deferring the radical operation to a later date, when a better condition, local and general, favors a better result. In an inoperable case, the artificial anus is the best for prolonging life. In this case the disease existed, undoubtedly, six years, as no wandering kidney existed. The fall probably caused localized inflammation and increased activity of the growth. I am quite well convinced if the complete operation had been performed two years earlier, a favorable result would have ensued. In future I should not use the button, which has not proved satisfactory in such cases. I should use a method which I have employed several times with very satisfactory results in closing artificial anus of large bowel. First, in end-to-end or lateral anastamosis, unite mucous membrane separately with chromicized gut, then muscular and serous coats, with supporting serous stitch, of catgut, all a running stitch. I first used such a stitch in 1892. The advantage of uniting the mucous membranes separately is, that it prevents contact of bowel-contents with overlying stitches (line of union), giving more time for perfect union, and also minimizing the danger of extravasation. On account of the condition of the intestine in acute obstruction, attempt at union immediately following operation is not now regarded with favor. The mortality is very high when complete operation is done at once.

There is no uniform procedure, but operation in two stages, sometimes three, is now in general use. Paul's method in obstruction from carcinoma is indorsed by Moynihan in his recent work on *Abdominal Operations*. The tumor is delivered without the abdomen, the mesentery and intestine above and below tumor

is stitched to the abdominal peritoneum, the tumor excised, and an artificial anus established in the afferent or proximal end. The abdomen is reopened in two or three weeks, and the anus closed by end-to-end anastomosis. Mikulicz pursued practically the same method. In the early stage of gradual obstruction, when patient's condition is not extreme, some deem it wiser to deliver the tumor and wait 12 or 24 hours before excising, for adhesions to occur. Moynihan pursues this course. Hartman removes growth at once, and inserts a tube in afferent end of intestine for drainage. and in two or three weeks reopens abdomen and unites intestines by lateral anastomosis — Moynihan, end to end. When obstruction is not present, the condition of the intestine above and below the tumor is healthier, and leakage and peritoneal infection less likely to occur. Under these conditions, immediate, complete operation and end-to-end anatsomosis should be the method of choice. In extreme conditions of obstruction, typhlotomy or colostomy, only, should be the primary operation, and preferably not at the site of the tumor

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## ECTOPIC DECIDUA FORMATION[1]

By FRED. J. TAUSSIG, M. D., St. Louis

ABOUT the third week of gestation there occurs at the point where the ovum is imbedded in the mucosa of the uterus, a hypertrophy of the connective tissue elements of the mucosa to form the so-called decidua. This layer extends over the entire mucous lining of the uterine cavity. In tubal gestation we have, in a certain percentage of cases, a similar reaction of the connective tissue-cell of its mucosa, and in ovarian pregnancy Webster has likewise noticed decidua-cells near the site of the ovum.

We find, besides this, however, in a considerable percentage of all pregnancies, no matter what the site may be, a formation of decidua-cells outside the point of implantation of the ovum, even at a considerable distance from it, and to this the term, " ectopic decidua formation," has seemed to me appropriate. A consideration of the material that has of recent years been accumulating regarding such decidua formation, together with some additional evidence derived from personal investigations, is the purpose of this paper.

The decidua-cell is described by Pfannenstiel as " round, oval, polygonal, at times spindle-like in shape and of varying dimensions (20–50μ). It has a delicate protoplasm and a large, usually rounded, nucleus. It is bound to its fellows as well as to the intercellular network by means of thinner or thicker prolongations, especially marked when a considerable amount of intercellular substance is present. Between the decidua cells are found smaller polygonal cells with darker granulated protoplasm and round, also darker-stained-nucleus, the beginning form of the decidua-cell (Marchand)."

The protoplasm of the decidua-cell usually takes a bluish stain with hæmalaun; the nucleus does not stain deeply. Sometimes decidua-cells lie together; sometimes they are separated by lymph-channels; often they are interspersed with leucocytes.

As the most important characteristic of the decidua-cell, Hirschberg specifies its unusual size, the staining quality of its protoplasm, and the variability in its shape.

As instances of ectopic decidua formation, we find in normal intrauterine gestation, so frequently as almost to be termed physiological, clusters of decidua-cells beneath the pelvic peritoneum, on the surface of the ovaries, and in the mucosa of the tubes. In tubal pregnancy, we find an extensive decidua in the uterus, and occasionally at various points, such as the non-pregnant tube, the serosa of the appendix, the omentum, etc. It was my good

[1] Read before the Chicago Gynecological Society, December 15, 1905.

fortune to operate on a case of tubal pregnancy of the fourth month in which the extent and site of decidual development was most unusual.

The case was of double interest, inasmuch as this unusual decidua formation occurred in a pregnancy of the fimbria ovarica of the tube that finally, by the spread of the placenta upon the posterior parietal peritoneum, became a case of secondary abdominal pregnancy. There was, moreover, a further complication with parovarian cyst and multiple myomata of the uterus. Following is the history of the case:

Mrs. J. S., aged 35 years, colored, had been married seventeen years without ever having become pregnant. She had had an attack about ten years previously that the doctor called " womb trouble," characterized by pains in the back and lower abdomen and a fever. She was sick for about a month at this time. The treatment consisted of rest and hot douches. Since then she had had occasional bearing-down sensations and backache.

The present trouble dated from January, 1904. Her menstruation occurred at the regular time — about the middle of the month — lasted three days, and was accompanied by cramping pains. Toward the end of January and during February she suffered from nausea and vomiting, worse in the morning hours. Her periods in February were more profuse, prolonged, and painful. Since then she had suffered off and on with severe cramping pains in the abdomen. No vertigo or fainting spells. In March there was again a menstrual bleeding, prolonged in duration (five days). In April, on the other hand, the bleeding was scanty, lasting only one entire day. For the past two months there had been a foul-smelling, at times blood-tinged, discharge.

Lately there had also been considerable burning and pain on urination, but no increased frequency. Particular trouble had been caused by the persistent constipation. Purgatives gave only temporary relief, and the pain and tenesmus on defecation was very severe.

Examination on May 13, 1904, showed that the breasts contained no colostrum. Abdominally, a rather firm, somewhat tender mass could be palpated, rising out of the pelvis and partly filling the hypogastric and right inguinal regions.

On vaginal examination there were no evidences of inflammatory lesions about the external genitals. Bimanually, it was ascertained that the cervix lay high up, close to the symphisis, pointing downward. It was partly softened, not tender, and fixed in its position by masses posterior, and to either side. The fundus could positively be distinguished from these masses by its connection with the cervix and firmer consistency. It lay anterior, pushed two fingerbreadths above the symphisis in the median line, adherent, not sensitive, apparently somewhat enlarged. Upon its anterior surface could be felt a small, hard nodule, the size of a hazel-nut, which was taken to be a small fibroid.

Filling the entire cul-de-sac, pushing the uterus upward and bulging the vagina downward, almost to the introitus, could be felt a fluctuating tumor, immovable, not very tender, about the size of a child's head. This tumor could be separated from the uterus, but could not be outlined clearly from masses lying higher up on either side. On the right side there was some tenderness. There was a blood-stained, stringy, rather profuse vaginal discharge. Temperature 98.4°; pulse 80–90.

The diagnosis was made of tubal pregnancy with myomatous uterus, and the patient advised to undergo an operation.

On May 20th I performed a laparotomy. On opening the abdomen a few old blood-clots were found clinging to the omentum, which was adherent to the pelvic mass. The ectopic gestation-sac, together with uterus, tubes, and ovaries, was found to be imbedded in adhesions. The uterus lay anterior, the tubes apparently not directly involved to either side, and in the cul-de-sac lay the unruptured fœtal sac with placenta adherent to its peritoneum. It was evidently impossible to lift out the sac without rupturing, so, the intestines being protected by gauze, the sac was ruptured, placenta and fœtus extracted as quickly as possible, and a large, firm gauze pack placed against the raw peritoneum, to which the placenta had been adherent. In this way the loss of blood was inconsiderable. The oozing ceased in a very short time. The quantity of amniotic fluid in the fœtal sac appeared to be rather small. Its physical characteristics could not be distinguished, owing to admixture with blood.

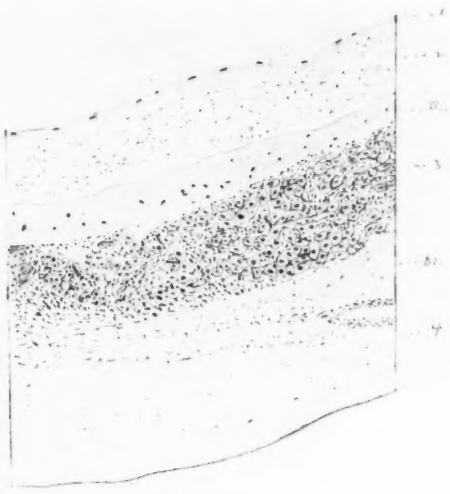

Fig. 1. Cross section of parovarian cyst.

1. Epithelial coat.
2. Fibrous coat.
3. Decidua.
4. Peritoneum.
*Bl.* Blood.

On the right side, a parovarian cyst, that had heretofore been beyond the reach of the palpating fingers, was now to be seen adherent to the base of the broad ligament. Both tubes and ovaries were imbedded in adhesions, and the uterus was, as expected, studded with numerous myomata. In view of these circumstances, and the large raw surface left posteriorly, it was decided to do a panhysterectomy with free vaginal drainage. This was accomplished without further difficulty, and the vesical peritoneum sewed to the rectal peritoneum at a point near the sacral promontory, in this way closing off the entire pelvis for purposes of drainage. The abdominal incision was closed in layers. The patient made a good recovery.

The specimen removed shows the following peculiarities:

The well-preserved female fœtus, 20 cm. long, is attached to the placenta by a long umbilical cord. Upon its head and back are blood-stained areas corresponding to the points at which it broke through the membranes and lay directly exposed to its fibrinous sac.

The placenta is unusually large and heavy, weighing but 40 grams less than the fœtus. Its maternal side is convex and perfectly smooth. There are many old and fresh hemorrhages in the intervillous spaces. The fœtal side is concave and irregularly nodular. The fœtal membranes extend for some distance beyond the placental margin, but, even allowing for the fact that a small portion of them may have been torn off, they are insufficient to have wholly inclosed the fœtus.

Coming next to the uterus, we find that organ enlarged to a nodular body, 12 cm. long, whose cavity measures 10½ cm. and is filled in its upper portion with fresh blood, whereas the cervical part is dilated by an older blood-clot. The uterine mucosa is of a yellowish-white color, and is markedly thickened. At some points it measures over 1 cm. It is somewhat irregular and very soft. The fibromuscular coat is also greatly thickened and contains a large number of myomata, varying in size from an apple-seed to an acorn; the largest projects upon the center of the posterior wall. In the peritoneal coat there are also several smaller myomata, one of which proved, microscopically, to be a cystic adenomyoma. The surface of the uterine peritoneum is roughened by numerous adhesions. Some of these, going from the uterus to the left tube, can still be seen.

The left tube and ovary are not much changed. There is some thickening of the tube, and the ovary shows points of hemor-

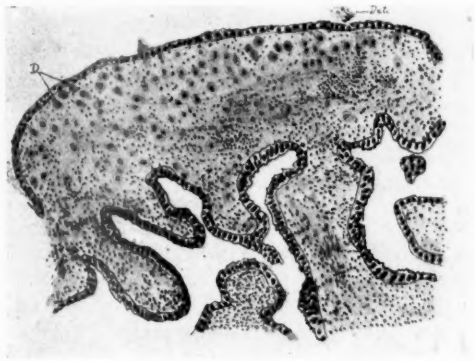


Fig. 2. Decidua surrounding the lumen in the mucosa of the non-pregnant tube. *D*, Decidue. *Det.*, Detritus.

rhage. Between the two could be seen a parovarian cyst, the size of a pea, which was removed for microscopic examination. There is also a cystic hydatid of Morgagni.

On the right side the tube is markedly thickened and somewhat tortuous. Its fimbriated extremity is flattened out to an area covering almost the palm of one's hand. Immediately beneath the fimbria lies a parovarian cyst, the size of a small apple, and the right ovary lies beneath and perfectly independent of this cyst. It shows no special abnormalities. A corpus luteum could not positively be identified in either ovary. Pieces were taken from different portions of the specimen removed and numerous microscopic sections made. The stains used were hæmatoxylin-eosin and van Gieson.

*Placenta.* In general, the microscopical picture was the same in the different portions of placenta examined. The amnion was intact and in excellent preservation. The nuclei of the amnion epithelium were well stained. There was no special tendency to proliferation. The amnion as a whole was but loosely attached to the chorion and formed at some points slight folds. The chorionic connective tissue contained blood-vessels of varying size, with open lumina, in which could be seen uncoagulated red-blood cells. The syncytium was everywhere, except in the older blood-clots, well preserved, showing innumerable epithelial buds. Langhans cells, on the other hand, were present in only a few places, and even then not as a continuous layer. The intervillous spaces were for the greater part occupied by more or less recently coagulated blood, intermingled with fibrin streaks. In the fibrin streaks were lodged irregularly oval areas, easily recognizable as necrotic chorionic villi. At the base of the placenta could be seen a thin covering resembling granulation tissue containing a considerable number of cells with long spindle or rod shaped nuclei. Over one portion of the placenta this layer was thickened, and gave the impression of being adherent peritoneum. Here the spindle-cells were larger and somewhat resembled decidua that had undergone compression. There was marked leucocytic infiltration.

*Tubes.* From four points on the flattened fimbriated end of the right tube pieces were

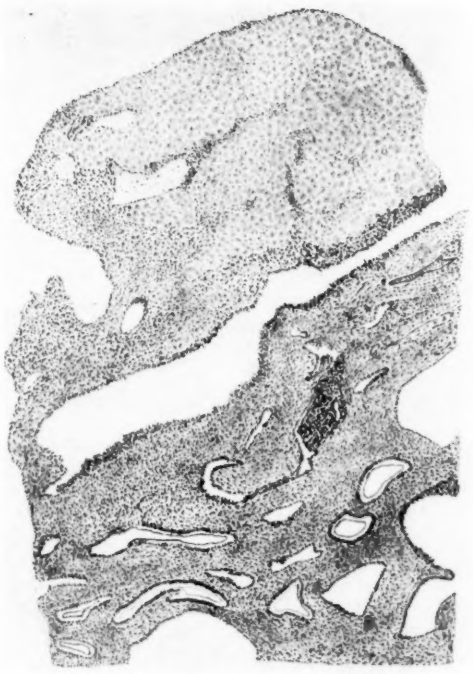

Fig. 3. Decidua in the tips of the folds of cervical mucosa. Taken from a point about 1½ cm. below the internal os.

examined. They showed a rather variable picture. In the more dependent portions there were found remnants of chorionic villi and syncytium penetrating the wall of the tube, but in their immediate neighborhood no decidua. The blood-vessels were greatly dilated and the tissues œdematous. At points small hemorrhages had occurred. The larger veins showed a marked hyperplasia of endothelial elements, and in their wall could be seen unusually large cells (15–25$\mu$) of an oval contour, in circular arrangement, whose protoplasm stained lightly with hæmatoxylin, and whose irregularly shaped large nuclei took a deep stain. Possibly these are to be considered as fœtal wandering cells. The epithelium of the fimbria was in great part intact. Between the folds lay partly organized blood intermingled with cellular detritus. The peritoneum of the tube at this point was infiltrated with blood, but showed no decidual elements. In the

ampulla of the tube the mucosa showed extensive proliferation, and the other coats were likewise hypertrophied. The folds of the mucosa contained numerous blood-vessels with thickened walls and had grown together at their tips. No decidual cells were present.

In the left, the non-pregnant, tube, sections half-way between fimbria and uterus showed the tortuosity of the canal, coalescence of the tips of the mucosa, and infiltration with leucocytes as found in chronic salpingitis. In one or two places near the lumen a few disk-like patches of decidua were noted directly beneath the here somewhat flattened tubal epithelium. There was considerable thicken-

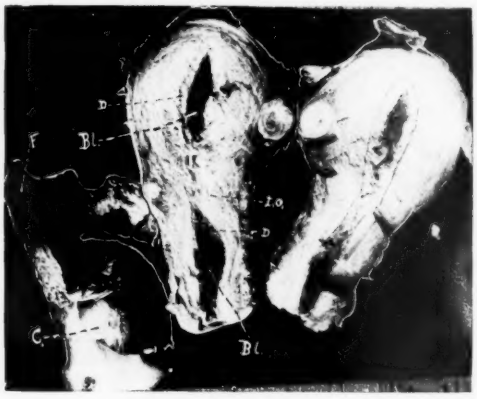


Fig. 4. Uterus and adnexæ of fimbria pregnancy. (Author's case.)
*C*, Parovarian cyst. *I. O*, internal os.
*D*, Decidua. *Bl.*, Blood-clot
*F*, Fimbria of pregnant tube.
The parovarian cyst was opened and filled with cotton.

ing of the muscular coat. Adhesions to the serosa contained a few nests of decidual cells, but in the serosa itself no such cells were encountered. Sections taken from the ampulla were only in so far different from the above that the decidua formed in the mucosa encircling the lumen was more marked. Very striking here was the distinct line of demarcation between the decidual layer and the deeper portions of the mucosa. The latter contained not a single decidual cell, whereas the superficial portions were one solid mass of decidual cells.

*Ovaries.* The right ovary contained many hemorrhagic areas, and on its surface was seen at one place a small nest of decidua-cells. The left ovary contained lutein-cells in considerable amount, but no evidences of decidua.

*Parovarian Cyst.* In three out of four pieces cut from the cyst-wall there were to be seen the following structures from within outward:

1. The greatly flattened epithelial lining of cyst, its cells coalescing to form a sort of syncytium in which could be seen at intervals darkly stained irregular nuclei.

2. The connective tissue coat of the cyst containing a few scattered spindle-shaped nuclei.

3. The decidual layer. In great part, this layer was not in patches, but surrounded a considerable portion of the cyst in the form of a continuous sheet of cells about four or five cells in thickness. These cells were large (30–40$\mu$), had a large round or oval nucleus with scanty chromatin, were somewhat irregular in shape, and occurred in bundles of 4–10 elements, separated by a fine network in which leucocytes were abundant. They contained no blood-pigment. The decidual layer was sharply defined from the fibrous coat of the parovarian cyst on the one hand and the peritoneum on the other. The capillaries here were numerous and greatly dilated, and in several places hemorrhages of considerable extent had recently taken place, lifting the decidua from one or the other of its neighboring layers.

4. The last coat consisted of the peritoneum, which was thickened by serous infiltration. Its endothelium was for the most part absent.

*Peritoneum.* The uterine peritoneum showed on the posterior surface a few yellowish nodes the size of a pin's head, that on section proved to be composed of decidua-cells. Numerous subserous myomata were sectioned, but only one showed any abnormality. This one proved to be a cystic adenomyoma, the size of a small pea. The lining of the cyst was a low epithelium. No embryonal connective tissue-cells were present, the epithelium lying directly upon the muscular and fibrous tissue. By its side, beneath the peritoneum, lay several areas of decidua-cells. Adhesions to the posterior surface at several points, as well as between the

uterus and the left tube, contained nests of decidual cells. Some of the latter adhesions contained fatty tissue, so that it is not unlikely that they represent bits of adherent omentum. At the time of operation the omentum was found adherent to the uterus, but no special attention was given to the exact site of these adhesions.

*Uterus.* Sections through the entire thickness of the uterine wall near the fundus revealed the marked hyperplasia of the muscular elements. Throughout the wall were disseminated larger or smaller myomatous tumors, the smallest of which were hardly larger than a pin's head. The mucosa consisted of a very thick compact zone and a very narrow spongy zone. Over the former the epithelium was everywhere absent. At intervals there could be noted clefts with smooth border dipping down from the surface, probably corresponding to the ducts of the uterine glands. Between the decidua-cells in this layer lay scattered numerous leucocytes. In the spongy portion the matrix was composed of the spindle or oval shaped connective tissue-cells of the normal mucosa. Here, too, there was considerable round-cell infiltration. Glands were found only in this layer, partly with epithelium intact, partly with their lumen filled by desquamated cells. They were either flattened out or dilated partially, and almost invariably ran parallel to the surface of the mucosa. In every section were found in large numbers round, peculiarly glistening bodies, lying free in open spaces in both compacta and spongiosa, sometimes of considerable size. The fact that small particles of this material are found in the desquamated epithelial cells of the glands has led Klein to regard them as the product of a hyaline metamorphosis of the substance of these cells.

*Cervix.* Sections of the mucosa directly at the internal os on both anterior and posterior walls were examined. The character of the cervical portion differed markedly from that of the body. Below the constriction of the internal os the mucosa showed glandular hyperplasia. The glands were dilated *ad maximum* with mucus, so that the epithelium often was flattened or cubical in shape. The mucosanguinous clot lying in the cervical canal was adherent to the surface epithelium. Several deep septa were found. For a distance a little over one centimeter below the internal os there appeared on the tips of the cervical mucosa patches decidual cells of typical size and shape. Below this point the most careful search failed to reveal any such elements.

For a proper appreciation of the questions arising concerning ectopic decidua formation, the facts in this case must be considered in association with the findings of others according to the site at which the decidua may form.

Ectopic decidua has thus far been encountered:

1. In the mucosa of the uterine body in extrauterine pregnancy;
2. In the cervical mucosa;

Fig. 5. Photograph of fœtus and placenta. (Author's case.) Note the incurving of the edge of the placenta.

3. In the non-pregnant tube of an extrauterine pregnancy and in both tubes in intrauterine pregnancy;
4. In the uterine peritoneum;
5. In the pelvic and parietal peritoneum;
6. In the ovaries;
7. In the serosa of the small intestines;
8. In the omentum;
9. In the appendix;
10. In an adenomyoma of the uterus;
11. In adhesive bands.

A uterine decidua is apparently very rarely found in the cases of early tubal abortion. Only from the second month on is it found with any degree of regularity. It then assumes the usual division of a compact and spongy layer.

We find it here forming a continuous layer, as distinguished from its appearance only in patches elsewhere. It is usually cast off as an entire membranous sac, or comes away in shreds. Where the uterus is obtained for examination after such expulsion, the mucosa may be found to be almost completely regenerated, showing no trace of decidua formation. It is not often that the uterus with decidua intact, as in my case, is obtainable for microscopic investigation. In such well-preserved specimens, the glands are partly formed with epithelium intact, but in the deeper segment are seen epithelial detritus and peculiar round glistening bodies similar to those found in normal pregnancy and most probably due to a hyaline metamorphosis of glandular epithelium. (Klein.) Such bodies were formed in my case. Proliferation of papillæ in the glands, deemed characteristic of normal pregnancy by Opitz, are, according to Werth, absent in the uterine decidua of ectopic pregnancy.

Concerning the blood-vessels, van Tussenbroek says that capillaries are occasionally found opening directly into the uterine cavity, thus causing the attendant bleeding. She emphasizes as distinguishing features of uterine decidua in extrauterine gestation, that the glands empty into the uterine cavity, and that we do not have fibrinous streaks as in normal pregnancy. Pozzi and Caseaux believe that the intensity of decidual reaction in the uterus is dependent on the proximity of the ovum. Caseaux cites a pregnancy in the isthmus tubæ with strong decidual reaction. There seems very little evidence supporting such a contention. In my case, the pregnancy was at the extreme end of the tube (the fimbria ovarica), yet the decidual reaction was throughout an unusually marked one. Werth has, in his experiences, found no evidence to support Pozzi's contentions. Although the muscular hypertrophy of the uterus seems dependent on the proximity of the ovum, the extent of decidua formation is, in his opinion, dependent on other causes.

Against Gebhart's statement that a true cervical decidua is never formed, we have now considerable evidence. Weiss, and, after him, Keilman and Ponfick, described cases of central placenta prævia where the cervix was directly involved in the placenta formation. Furthermore, we have now considerable evidence showing that on rare occasions in intrauterine gestation we may find in the cervix patches of decidual calls. There are the following reports: von Franque, 2 cases; Waldstein, 1; Volk, 2; Blumberg, 2; Hohmeier, 4. To these eleven cases of intrauterine pregnancy I can now add another, the only case on record, to my knowledge, where a cervical decidua was found in ectopic gestation. Particular interest is attached to the matter, since the cases in which a cervical decidua was found have in six out of eleven cases been in placenta prævia, and in several others there was a deep lateral site of the placenta. Blumberg even goes so far as to say that the excision of a piece from the cervix may lead to a diagnosis of placenta prævia, since he feels warranted in the belief that such decidua formation occurs with a certain uniformity in cases of placenta prævia. Whatever may be proven by further evidence on this subject, the converse statement, that only where the placenta is attached at or near the internal os, are decidua-cells found in the cervix, cannot, on the strength of my case, any longer be maintained. In two of Hohmeier's cases, also, the placenta was attached at a considerable distance from the cervix.

Through the courtesy of Dr. Carl Fisch I can add one additional observation of deciduaformation in the cervix to those already mentioned. It was a patient in the fourth month of pregnancy, from whom had been removed a small polyp just within the external os. The polyp showed a dense mass of typical decidua-cells directly beneath the epithelium. In this case, later observation showed positively that the placenta was not attached near the cervix, but lay near the fundus, on the anterior surface.

In the non-pregnant tube, it was Webster who first pointed out the occurrence of a decidual reaction. Williams had a similar case, of which he gives a microscopic drawing in his text-book on obstetrics. Lange, in fifty cases of intrauterine gestation, found decidua in one of the tubes five times. These findings were corroborated by Mandl and others. Voigt reported a case of fimbriated pregnancy in which a decidual reaction was found in two accessory

tubes. In my own case, although numerous sections from various portions of the pregnant tube showed no decidua, I found in the non-pregnant tube near the ampulla a well-marked formation of decidua at the tips of the mucosa.

The presence of decidua-cells in the pelvic peritoneum, in all forms of gestation, has, of late years, been so frequently noted as to be termed physiological. Kinoshita examined eleven puerperæ for this purpose, and found decidua in every case, especially in the posterior cul-de-sac. Schmorl, in seventy cases, confirmed the findings of Pels Leusden regarding the appearance of decidua-cells in the pelvic peritoneum in intrauterine gestation. Walker found decidua-cells in abdominal pregnancy, and considered them typical of this form of pregnancy, but, in view of the findings of Schmorl and Kinoshita, this view is no longer tenable. These decidual patches, according to Schmorl, may occasionally acquire a thickness of two or three mm. and appear as white knots, sometimes attaining the size of a pea.

Stravoskiadis, in fifteen out of eighteen cases of intrauterine gestation, varying in development from the second to the tenth month, and including several puerperæ, found a formation of decidual tubercles over the anterior parietal surface of the rectum, the floor of Douglas's cul-de-sac, and the posterior surface of the uterus. Schmorl also found this to be the favorite site for decidua. On the anterior surface of the uterus he found it only where there were adhesions between uterus and tubes and the surrounding structures. In my case a very marked decidual formation occurred between the peritoneal and fibrous coat of a parovarian cyst. I failed to find record of any similar case in literature.

In a few cases, decidua has been found in the serosa of the Fallopian tube and broad ligament; and finally, also, in the parietal peritoneum by Amos, Schmorl, and by Fisch in Tuholske's case of secondary abdominal pregnancy.

Adhesions seem to further the development of decidua, since in such cases they are very extensive. Where the intestines are adherent, their peritoneum occasionally reacts to the decidual impulse. In the adhesions themselves the decidua-cells may also be found, as in my case. Finally, Penkert discovered them in the adherent omentum of a tubal pregnancy. He came to the conclusion that in the omentum the decidua-cell is derived from the fat-cell. Their appearance in the omentum is not, however, solely dependent on such adhesions, as Schmorl saw them three times in the non-adherent omentum. Prochownick describes an instance of decidua throughout the greater omentum in a full-term extrauterine pregnancy. Schmorl calls attention to the fact that in his cases the decidual knots occurred in the form of pediculated white structures, the size of a pin's head or larger, along the lower margin of the omentum. Sometimes they were semi-transparent and flattened. Invariably, these authors found the decidua beneath the endothelial covering of the peritoneum, and evidently were not derived from the latter, but from the loose connective tissue cells.

Considerable interest attaches to the frequency with which decidua-cells are found in the surface of the ovary. Schmorl and Kinoshita considered their presence here as invariable. Webster found decidual changes in four out of ten ovaries of normal uterine pregnancies. In each case the areas were situated about the surface, and the line of demarcation was distinct. Usually, these areas contained dilated blood-vessels. Webster had never seen such areas in the ovaries of non-pregnant women. Schnell examined thirty-one ovaries — eleven from non-pregnant women seven from pregnant women, and thirteen puerperal. Out of the twenty last named, he found seventeen times, in the albuginea, cells which he took to be decidua. These cells were absent in the non-pregnant women. Lindenthal found (fifteen out of thirty-four times), in the ovaries of both intrauterine and extrauterine gestation, after the third month, a change of the spindle-cells in the albuginea to decidua. These increased in quantity up to the seventh month, then showed a retrogression. He believed that these areas persist a long time after delivery, so that the ovary of a woman who has had children can thereby be told from that of a nullipara.

In his case of ovarian pregnancy, Webster believed he had found a decidua-cell formation

near the large blood-spaces lying in that part of the gestation-sac near the hilum.

There are now two cases on record — that of Amos and that of Cameron — in which a decidual reaction was found in the mucosa of an adenomyoma in pregnancy. The case of Amos was that of a myomatous uterus in the fifth month of pregnancy removed supravaginally. Cameron's case seems somewhat doubtful, since the specimen is not fully described.

Finally, decidua-cells have been found by Hirschberg in the serosa of the appendix. It was in a patient who was operated on for a tubal pregnancy of about three months' gestation, and in whom the appendix was found adherent, and was consequently removed. Hirschberg's microscopic descriptions are very conclusive. To see how constant this reaction was, he examined the adherent appendix of another case of tubal pregnancy (five months' gestation), but found no decidual reaction.

Additional evidence on this point may be furnished by the following case, in my own experience.

On September 17th, Mrs. B., aged 29, developed symptoms suggestive of the rupture of a tubal pregnancy. On September 27th I was called in consultation by her family physician, Dr. W. H. Fuchs, and concurred in the diagnosis. We operated on October 4th, and found a ruptured tubal gestation on the right side, of about five or six weeks' development. The fœtus, one and a half centimeters long, lay in the intact tubal mole. The appendix was found imbedded in hemorrhagic masses, and removed. Recovery uneventful.

A large number of sections were made from three portions of the appendix and its mesentery, but no trace of decidua was found anywhere. From two places in the pregnant tube, from the fœtal blood-mole, and from a piece of adherent parietal peritoneum removed at the operation, sections were cut, but in these, likewise, there existed no evidence of any decidua formation. The decidual reaction in the appendix can therefore not be considered a uniform procedure, but is probably exceptional, and dependent partly on the duration of the pregnancy, partly on the extent of the decidual reaction found elsewhere.

After this brief review of the various reports of ectopic decidua formation in both intrauterine and extrauterine pregnancy, it will be interesting to consider what deductions, if any, we may draw from them regarding the genesis of the decidua-cell. I do not deny that the mass of evidence on these matters is still very meager, but I believe that occasionally such synthetic studies point out to us new lines of investigation, and so eventually lead to a solution of the problem. Let us, to begin with, summarize in a few sentences our present knowledge on the question of decidua formation.

The decidua-cell is a derivative of the loose connective tissue-cell of the embryonal type, of the spindle-cell in the albuginea of the ovary, and possibly also of the fat-cell in the omentum.

It is found only in pregnancy. It is, as far as I have been able to ascertain, *not* found in all organs where such loose connective tissue is present — for instance, the pleura or the mucosa of the stomach — but only in the organs standing in close anatomical relation with the pregnancy (ovary, tube, peritoneum, omentum, appendix).

In intrauterine gestation the decidua formation is most marked at the site of implantation of the ovum. In ectopic gestation, however, the decidua formation is more marked away from the ovum than at the place where it lies imbedded.

The uterus is the site of the most extensive decidua formation, independent of the location of the pregnancy. Here it forms, almost invariably, a definite layer, whereas at all other points (ovary, tube, cervix, peritoneum) it forms only discrete patches or nodes of greater or less extent.

These patches almost always lie superficial, i. e., on the tips of the folds of the mucosa, directly under the epithelium, or immediately beneath the peritoneum.

They are found in portions not directly connected with the blood-supply of the uterus, such as the non-adherent omentum.

They are most marked from the third to about the seventh month of gestation.

What theory of decidua formation can be suggested that will not be at variance with these actual findings?

It has, in the first place, been believed by

Webster that decidua formation is peculiar to the Muellerian tract. The fact that it is found in the ovary and in the peritoneum of the cul-de-sac he seeks to explain on the ground that we have here misplaced Muellerian tissue. Considering the fact that Schmorl and Stravoskiadis found decidua-nests *almost invariably* at these points, we would have to assume that in practically every case there is misplaced Muellerian tissue. The present status of our knowledge on this point would hardly justify such an assumption. More recently, decidua has been found in the non-adherent omentum, in the serosa of the intestines and the appendix. Here it is most unlikely that any Muellerian tissue should be found. These findings, it seems to me, make the Muellerian theory seem very improbable.

The thought naturally suggests itself, that the decidua is a result of the increased flow of blood to the pelvic organs during pregnancy, with resulting œdema. We know that during menstruation there is a somewhat similar, though far less extensive, increase in size in the connective tissue-cells of the mucosa. Against this theory speaks the fact that ectopic decidua is found, not uniformly, but in patches, and, above all, that it is found in parts, such as the omentum and the appendix, that have a blood-supply absolutely distinct from the uterus.

That the decidua-cell is not due directly to any irritation on the part of the syncytium would seem probable from its absence in cases of syncytioma. Nor does the life of the fœtus seem to be essential for its formation, in spite of Penkert's assertions to the contrary. Penkert found decidua absent in several cases of tubal pregnancy in which the fœtus was macerated or missing. Without going into the evidence regarding this point in tubal gestation, I should like to call attention to the findings in the so-called hæmatom-mole. Here the embryo usually dies at about the fifth or sixth week of gestation, but the ovum is retained seven to eight months. The decidua, in the majority of these cases, is, nevertheless, not only not absorbed, but is indeed in perfect preservation. It seems likely that metabolism can go on in the placenta even after the death of the fœtus, as indicated by Hitschman's case of eclampsia and hydatid mole with absent fœtus.

It is conceivable, therefore, and not wholly improbable, that it is the presence of certain end-products of placental metabolism that incite in the loose connective tissue-cells of the uterine mucosa the typical decidual change. That the uterine mucosa, even in extrauterine pregnancy, is the point where the decidua is most profuse is possibly due more to the particular susceptibility of this structure to such irritation than to any large quantity of these end-products passing into the uterine cavity.

The formation of ectopic decidua elsewhere, in the peritoneum, the ovary, the non-pregnant tube, the omentum, is even more difficult to explain. Yet there are certain striking facts that may perhaps point to us a way. Webster states that in the tubal mucosa the decidua is found encircling the lumen. This was strikingly exemplified in the section of the non-pregnant tube in my case. It is *on the tips* of the mucosa, whether in the tube or cervix, it is *in the surface* of the ovary, it is *directly beneath* the peritoneum, that the decidual reaction is found. Does not this point to some *surface irritation?* But how can such an irritation reach these various points? Hardly through the blood or lymph-channels. In my sections, and in the illustrations and descriptions of others, the nests of decidua are not grouped about the capillary lymph or blood vessels. They lie, for the most part, rather in flat areas or partially raised tubercles directly beneath the surface. On the other hand, *the passage of substances from the placenta through the lumen of the tubes and out through the fimbriated end over the ovaries and pelvic peritoneum* might readily bring about such a spread of the irritation capable of producing decidual reaction. I cannot see in the distribution of the loose connective tissue-cells in the normal tubal mucosa any reason why only those cells surrounding the lumen should show a decidual reaction and not the others, unless it be the fact that this portion of the mucosa was the only one subjected to the necessary stimulus. Furthermore, Schmorl and others, as already mentioned, have found decidual patches with greatest regularity in the peritoneum of Douglas's cul-de-sac and that covering the rectum and posterior

surface of the uterus. Material passing out through the tube would naturally drain into this pouch. Anteriorly, the peritoneum showed only rarely, where adherent, any decidual knots. The frequency with which the decidua is found on the ovaries is also suggestive in this regard. In order to produce a decidua in patches and with such peculiar localization, the material could not be freely soluble, for then these products would naturally be rapidly diffused over the entire abdomen. We can, however, conceive the possibility that the material that stimulates decidua formation consists of cellular detritus from the placenta. Such detritus, passing out through the tube, would be distributed about the lumen of the tube and over the ovaries and posterior pelvic peritoneum.

I grant we are here going far into the ranks of speculation, and I only mention the matter here because it suggests itself by the peculiar anatomic distribution of ectopic decidua. An ultimate solution of the problem will possibly follow upon the advances in our knowledge of maternal and fœtal metabolism.

BIBLIOGRAPHY


1. Amos. Demonstr. Berl. Gyn. Soc. Zeitschr. f. G. u. G., vol. liv, p. 171.
2. Bandler, S. W. Uterine and Tubal Gestation. New York, 1903.
3. Blumberg. Ueber Deciduazellen in der Cerviz Uteri bei intracorporaler Graviditaet. Arch. f. Gyn., vol. lxxv, 1905.
4. Von Both. Rechtseitige Tubarschwangerschaft. Monatssch f. G. u. G., 1899, p. 782.
5. Cameron. Complications of Uterine Fibromyomata. Brit. Med. Jour., Sept. 23, 1905.
6. Caseaux. Muceuse uterine dans les grossesses ectopiques. Annal. de Gyn. et Obst., Fev., 1904.
7. Dobbert. Beitrag zur Anatomie der Ektopischen Schwangerschaft. Virch. Arch.,vol. cxxvii, p. 397.
8. Von Franque. Cervix und unteres Uterinsegment. Stuttgart, 1897.
9. Gebhart. Pathologische Anatomie der Weiblichen Sexual-organe, 1899, p. 472.
10. Herzog. Pathology of Tubal Pregnancy. Amer. Jour. of Obst., vol. xlii, p. 145.
11. Hirschberg. Deciduazellbildungen um Wurmfortsatz bei Tubenschwangerschaft. Arch. f. Gyn., vol. lxxiv, p. 620.
12. Hitschmann. Eclampsie im fuenften Schwengerschaftsmonat ohne Fœtus bei Blasenmole. Centralbl. f. Gyn., p. 1089, 1904.
13. Hohmeier. Ein Beitrag zur decidualen Reaction der Cervix. Monatsschr. f. G. u. G., Sept. 1905.
14. Josefson. Decidua-cellulare Wucherungen im Peritoneum. Rev. in Centrbl. f. Gyn., vol. xxi, p. 1531, 1897.
15. Kamann. Primaere Abdominalschwangerschaft. Centrbl. f. Gyn., No. 17, 1903.
16. Keilmann. Eine Cervix Placenta. Centrbl. f. Gyn., No. 27, 1897.
17. Kermauner. Beitraege zur Anatomie der Tubenschwangerschaft, Berlin, S. Karger, 1904.
18. Kinoshita. Grosszellige Wucherungen am Perit. u. Ovar. Bei Intra-ut. Schwangerschaft. Monatssch. f. G. u. G., vol. viii, p. 500.
19. Klein. Entwickelung und Rueckbildung der Decidua. Zeitschr. f. G. u. G., vol. xxii, p. 261.
20. Kuehne. Beitraege zur Anatomie der Tubenschwangerschaft. Marburg, 1899.
21. Kuestner. Das untere Uterinsegment und die Decidua cervicalis. Jena, 1882.
22. Lange. Beitraege zur Frage der Deciduabildung in der Tube bei tubarer und intra-ut. Graviditaet. Monatssch. f. G. u. G., vol. xv, p. 48.
23. Leusden, Pels. Ueber die serotinalen Riesenzellen. Zeitschr. f. G. u. G., vol. xxxvi.
24. Linck. Fall von Primaerer Bauchhoehlenschwangerschaft. Monats. f. G. u. G., vol. xx, p. 1256, 1904.
25. Lindenthal. Decidua Ovarii und ihre Beziehung zu gewisse Veraenderungen am Ovarium. Monatsschr. f. G. u. G., vol. xiii, p. 1718.
26. Mandl. Ueber den feineren Bau der Eileiter waehrend und ausser halb der Schwangerschaft. Monatsschr. f. G. u. G., vol. v, p. 130.
27. Marchand. Beitrage zur Kenntniss der normalen und pathologischen Histologie der Decidua. Arch. f. Gynaek., vol. lxxii, 1904.
28. Nebesky. Casuistik der Bauchhoehlenschwangerschaft. Centrbl. f. Gyn., No. 7, 1904.
29. Opitz. Ursachen der Ansiedelung des Eiies im Eileiter. Zeitschr f. G. u. G., vol. xlviii, p. i, 1903.
30. Penkert. Ueber Decidua Veraenderung im Netz bei Tubo-abdominal Schwangerschaft. Zeitschr. f. G. u. G., vol. liv, p. 80.
31. Ponfick. Ueber Placenta Preavia Centralis. Berl. Klin. Wochen., No. 35, 1899.
32. Pozzi. Traite de Gynecologie, p. 847.
33. Prochownick. Muenchener Mediz. Wochenschr., No. 11, 1899.
34. Von Rosthorn. Die Veranderungen an den Geschlechtsorganen in der Schwangerschaft. Von Winckel Handbuch der Geburtshülfe, vol. i, p. 204.
35. Schmorl. Pathologisch-anatomische Demonstration. Dresden Gynaek. Ges., March 20, 1902.
36. Schmorl. Ueber grosszellige Wucherungen auf dem Peritoneum und Ovarien bei Intrauterinschwangerschaft. Monatsschr. f. G. u. G., vol. v, p. 46.
37. Schnell. Bindegewebszellen des Ovarium in Graviditaet. Zeitschr. f. G. u. G., vol. xl, p. 267, 1899.
38. Stravoskiadis. Ueber die Bildung von Deciduagewebe am Peritoneum. Wien Kl. Wochen., No. 41, 1901.
39. Taussig, F. Die Breus'sche Hematom-mole. Archiv. f. Gyn., vol. lxviii, pt. 2.

40. TUHOLSKE. Report of a Case. Amer. Gyn. and Obstet. Jour., Dec., 1901.
41. VON TUSSENBROEK. Die Decidua-uterina bei ektopischen Schwangerschaft. Virch. Arch., vol. cxxxiii, p. 207.
42. VOIGT. Schwangerschaft auf der Fimbria ovarica. Monatsschr. f. G. u. G., No. 8, p. 225.
43. VOLK. Decidua im Cervix. Arch. f. Gyn., vol. lxix, p. 683.
44. WALDSTEIN. Decidua im Cervix. Zentralblatt f. Gyn., p. 674, 1900.
45. WALKER. Der Bau der Eihäute bei Graviditas Abdominalis. Diss. Berlin, 1887.
46. VON WEISS. Zur Kasuistik der Placenta Preavia Centralis. Centrbl. f. Gyn., No. 22, 1897.
47. WEBSTER. Etopic Pregnancy. Edinburgh, 1895.
48. WEBSTER. Human Placentation. Chicago, 1901.
49. WEBSTER. Study of Ovarian Pregnancy. Amer. Jour. of Obstet., vol. l, p. 28.
50. WEBSTER. Text-book of Obstetrics. 1903.
51. WERTH. Die Extra-uterin Schwangerschaft, in von Winckel: Handbuch der Geburtshuelfe, vol. ii, pt. 2, p. 774.
52. WILLIAMS. Text-book of Obstetrics, 1903, p. 546.
53. WILLIAMS. Contribution to the Normal and Pathological Histology to the Fallopian Tubes. Amer. Jour. of Med. Sciences, Oct., 1901.
54. WITTHAUER. Primaere Bauchhohlengraviditaet auf einem Netzzipfel Zent. f. Gyn., No. 5, 1903.
55. ZWEIFEL. Vorlesungen ueber Klinische Gynaekologie. 1897.

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# ON EXTENSIVE SEPARATION OF THE PERIOSTEUM IN DISPLACED BONE FRAGMENTS[1]

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THE more or less extensive tearing of the periosteum is a natural mechanical result of the solution of continuity of bone. We assume that small periosteal shreds are scattered around the area of fracture. During the process of healing, these particles of periosteum commence to proliferate in the sense of an ossifying periostitis, until they finally produce the external or periosteal callus.

Small platelets of bone which have been ripped from the cortex are found in those cases in which a great amount of violence has been exerted, and where marked displacement of the bone fragments exists. At times we find minute pieces of bone which lie at such a distance from the point of fracture, that all connections between them and the bone seems severed. The general consensus of opinion has been that these loosened particles become impaled in the soft tissues and acquire nutrition from them. During the past I have believed in this theory myself, but this skiagraph (Fig. 1) which now lies before you has shaken my belief. As I study this case I must come to the conclusion that in many similar cases periosteal bands exist, but are of such flimsy construction that they are, as a rule, overlooked. They then form the nutrient factor to these fragments. The skiagraph, taken five weeks after the injury, shows a band of periosteum about five inches long running from the upper radial fragment. I might compare it with a sheet of bark which has been stripped from a green tree, still adhering at one end to its nutrient basis. In spite of the extensive injury, a loosening only, not a tearing, of the periosteum was caused. The picture, taken by Dr. Eric Carl Beck, portrays the condition, surely one of greater frequency than generally believed, very distinctly. Unless the technique is a perfect one, the result will be that the bones are too vigorously irradiated, and the more delicately formed periosteal band will be radiated away, so to speak. The more recent the injury, the greater the liability of making this error.

The print likewise demonstrates the difficulty of reposition. The patient being under ether, I bent the ulna, and having noticed a perceptible outward rotation of the radius, felt assured of apposition of the fragments. While an assistant pressed the ulna inward by means of a bandage loop, I applied a plaster-of-Paris dressing. A skiagraph (Fig. 2) was taken immediately after and showed me that I had

[1] Demonstrated before the German Medical Society, New York, December 4, 1905, and before the Society of Medical Jurisprudence, January, 8, 1906.

not been successful in replacing the fragments. Therefore I took off the dressing and applied another. (Fig. 3.) The result, as you see, is a far better one, although it is unsatisfactory. Still, the function of rotation is not disturbed

Fig. 1. Extensive periosteal separation.

any longer. I had advised the patient, however, to have the fragments placed in direct apposition, and he finally consented to approximation by the chisel. The fragments remained *in situ* after simple indentation.

Fig. 2. Failure of reposition, as seen through a plaster-of-Paris dressing. (Compare Fig. 1.)

Fig. 3. After second effort at reposition. (Through plaster cast.)

Fig. 4.

Fig. 5.

I wish to remark that the periosteal band followed the upper fragment, and that considerable callus, which formed upon it, can even clearly be seen, in Fig. 3, although the picture was taken through the plaster cast.

The importance of the question of periosteal dislocation is verified by another picture of a fracture of the humerus which I wired. (Fig. 4.) Due to the extensive displacement of the fragments, the periosteum was loosened from the bone over a wide area. After the operation this grew to such an extent that it became an impediment. (Fig. 5.) I removed it subsequently, as it might have interfered with the muscular action. This teaches us to consider this possibility in all cases of bone-suture, and makes it advisable to remove all miniature fragments and such portions of periosteum as protrude beyond the point of fracture. If this is not done, the process of healing may become in itself a disease, just as benevolence may turn to plague sometimes.

In this wise the wonderful rays constantly produce new impressions, by the study of which we gain ever-increasing knowledge concerning the internal mechanism of the healing of bone injuries.

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## REPORT OF A CASE OF GLUTEAL CAVERNOUS ANGIOMA [1]

By J. E. SUMMERS, JR., M. D., Omaha, Nebraska

THE cavernous nævus or angioma is a form of blood-vessel tumor included under the general heading of angiomata, and is typified by clinical and pathological findings.

Angiomata are divided according to their peculiar predominating characteristics; such as the kinds of blood-vessels (veins, arteries, or capillaries), most conspicuous in their formation, as well as the form, size, and life history of the growths. They are usually recognized under three headings: 1. The simple nævus; 2. The plexiform anigioma; 3. The cavernous angioma.

The cavernous angiomata, because of their erectile type, have been likened to the spongy tissue formation of the erectile bodies of the penis. The tumors (Senn) are of larger size than the capillary variety, and are composed of irregular blood spaces and sinuses, whose walls are fibrous septa lined with endothelium and communicate freely with one another.

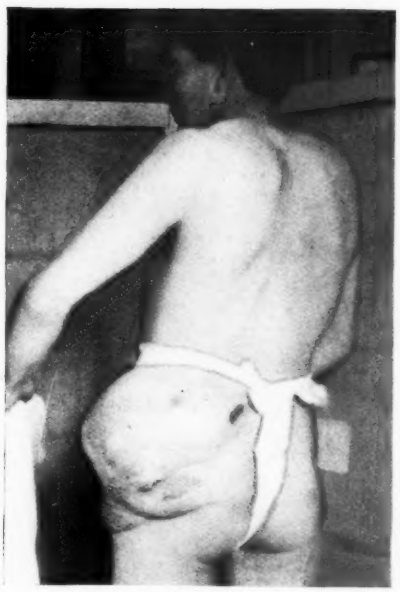
The new blood spaces are formed by angioblasts (a form of fibroblasts) whose function is to produce new blood-vessels in the cellular connective tissue.

Some cavernous angiomata are made up by vessels and spaces of irregular forms; others, of these spaces alone. When this latter condition exists, it will be found that blood-vessels, sometimes of large size, will be found in its periphery. Cavernous angiomata are usually spleen, kidney, and tongue. As a congenital affection we occasionally see a combination of cavernous angioma with lipoma — a nævolipoma. Likewise, as a result of clotting, a cavernous angioma may take on a cystic degeneration. (Treves.)

Clinically, cavernous angiomata are compressible and irregularly lobulated. When situated near the surface, they are of a blue color. A cutaneous nævus may lie over a more deeply situated cavernous tumor, and large surface vessels may be seen to dip into the angioma.

The occurrence of cavernous angiomata in voluntary muscles, according to Sutton, is uncommon, and upon examination of the literature I find little written. Campbell de Morgan (*Brit. and Fr. Med. Chir. Review*, 1864) reports a case occurring in the semitendinosus muscle of a girl ten years old. The tumor was congenital. Because of its rapid growth, it was removed, and found, histologically, a characteristic angioma. A few other cases have been reported; among them, one of the deltoid excised by Homes Coote. The patient was a little girl, and the tumor was congenital. Liston removed one of these

[1] Read before the Western Surgical and Gynecological Association, Kansas City, Missouri, December 28, 1905.



Photograph of patient.

growths, probably congenital, from the semimembranous muscle of a ten-year-old boy. Besides these cases referred to by Sutton, little is to be found in our text-books, although, no doubt, many cases have been met with by surgeons, but not recorded.

The subject of my report is J. C., 33 years of age, occupation laborer, single, native of Ireland, height 5 feet 11 inches, weight 165 pounds. My knowledge of this man dates back eight years, at which time I saw him, in the absence of a colleague, in the Douglas County Hospital, Omaha, suffering with a big hæmatoma of the left buttock, evidently caused by the rupture of some large blood-vessel or blood-vessels, and due to a fall. My colleague attacked the tumor by a free incision, and met with less active hemorrhage than expected. The patient's stay in the hospital was not prolonged, and he did not again come under my observation until January, 1905. At this time he was brought to the Clarkson Hospital with an ugly-looking swelling in the left gluteal region, this having developed suddenly as the result of a fall from a wagon. The history showed that since his operation he had been well, although he felt there was "something wrong" deep in the left buttock. The photograph shows the size of the swelling. It had the usual characteristics of a hæmatoma, the blood being nearer the surface in some areas than in others, and in certain places threatened rupture. It was non-pulsating, and the skin was, over parts of the area involved, uneven, and in it were many flat lipomata and nævo-lipomatous tumors, varying in size from a dime to a half-dollar. Notwithstanding the history of the case, I had to consider the probability of dealing with a ruptured aneurysm of the gluteal or sciatic arteries. That the origin of the hemorrhage was deeper than the skin was evident.

A ruptured gluteal or sciatic aneurysm would present symptoms similar to those of the case presented, but the blood of a ruptured sciatic aneurysm would hardly appear towards the surface so rapidly; besides, there had been no history of sciatic pain prior to rupture (a usual symptom). There were no pelvic symptoms. These seemed to eliminate the sciatic artery. However, there was nothing to eliminate a ruptured gluteal aneurysm, except perhaps the lipomata on the skin over the swelling, and these might readily be accounted for by the earlier injury. I therefore determined, as a precautionary measure, before operating, to control the circulation by having an assistant compress the left common iliac artery through an abdominal incision.

This was done, and upon cutting into the swelling and clearing away the clots, it was found that much of the upper and middle portions of the gluteal maximus muscle were involved in a cavernous angioma, and there were many large blood-vessels, arteries, and veins entering the growth around its periphery. The portion of the muscle involved with much overlying skin was excised, and the afferent and efferent vessels ligated. There was no hemorrhage, other than such as I desired my assistant to allow, in order that I might individualize all the blood-vessels concerned. The tumor proved to be a true cavernous angioma. There was no sign of a return of the tumor several weeks ago, when I last saw the man.

# DEPARTMENT OF TECHNIQUE

## A NEW METHOD OF LATERAL ANASTOMOSIS

By AXEL WERELIUS, M. D.
Surgeon to St. Bernards and Englewood Hospital

About a year and a half ago I reported in the *Journal of the American Medical Association* the technique of a new method of lateral anastomosis.

Since that time I have made numerous experiments on dogs, with excellent results.

The operation has been performed five times on human subjects, with no death directly due to the operation.

As I have slightly modified the technique, I will again repeat stages of operation.

Step 1. Fix by guy-suture opposing surfaces of intestines, of stomach and intestine, as the case may be, and sew (Fig. 1) with running almost through-and-through suture.

Step 2. Insert a silk or twine ligature or silver wire (Fig. 2), running into lumen of bowels, as in the McGraw ligature.

Step 3. Cover the silk ligature by folding adjacent parts of intestines over it and sew with almost through-and-through suture, leaving the free ends of the silk ligature on the outside. (Fig. 3.)

Step 4. An assistant holds the united tissues firmly along whole length of suture. By alternate pulling of the right and left ends of the silk ligature, the tissues are neatly cut through and an anastomotic opening is made, the thread escaping through the minute slit between the sutures. Tie beginning and end of suture thread, and operation is complete. (Fig. 4.)

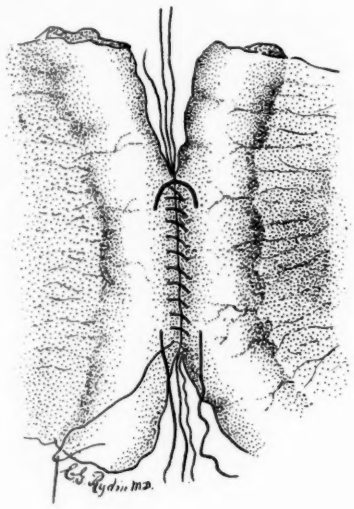


Fig. 2.

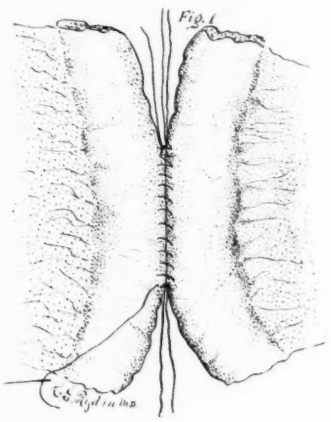


Fig. 1.

Figs 1, 2, 3, and 4 furnished by courtesy of the Journal of American Medical Association.

### CONSIDERATION OF POSSIBLE OBJECTIONS

1. *Hemorrhage.* In my vivisections and in the few humans operated upon, there has been no hemorrhage. To insure hæmostasis absolutely, one could tie off gastroepiplioca dextra or sinistra to an extent corresponding to length of intended opening.

2. *Cutting Thread Running into Suture Line.* This is a very remote possibility. The thread runs with mathematical precision between points through which it is inserted, and nowhere else. The openings through which thread escapes form fixed points, towards which it runs.

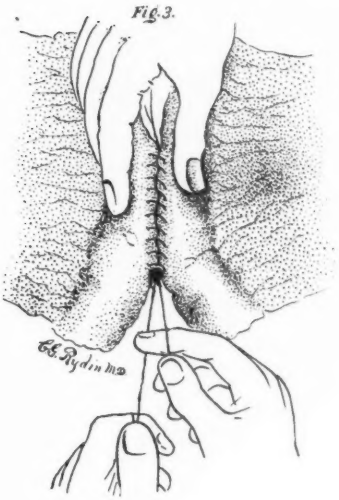



Fig. 3.

Should, possibly, such an accident occur, that would be detected when you examine your suture line, and then the weakened spot would have to be reinforced by an outer suture.

3. *Including Cutting Thread in Suture.* This is impossible with ordinary care.

4. *Breaking off of Cutting Thread.* If you use wire, then that is impossible, and if you employ, as I have done, a fish-line, that would hardly be possible. Still, for absolute safety's sake, a double cutting thread (as suggested by Ochsner) may be introduced, one of them being used for cutting and the other left in reserve.

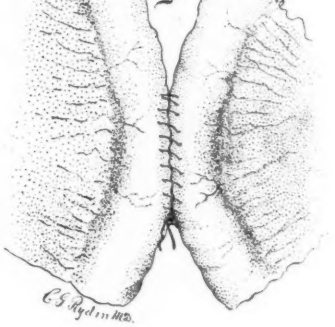



Fig. 4.

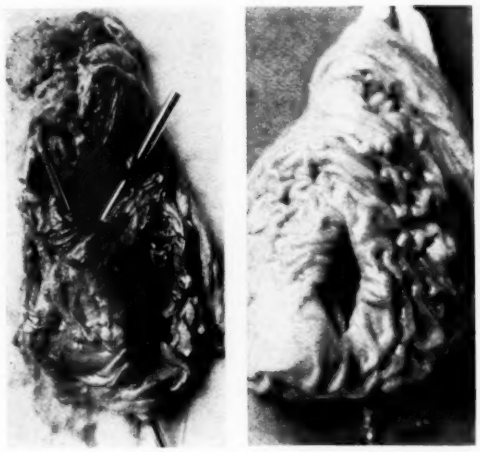


Fig. 6. Fig. 5.

Fig. 5. Anastomotic opening in dog, eight weeks after operation.

Fig. 6. Specimen from woman 74 years old, who died 21 days after operation, from pneumonia.

ADVANTAGES

1. Extremely simple technique.
2. Very little time expended.
3. No exposure of interior of viscera, greatly limiting infection.
4. Very little shock, as evidenced in a case of a woman 74 years old, who, in getting off the table, had a pulse of only 84.
5. No puckering of tissues.
6. No foreign body.
7. Operation complete at once.
8. No complicated instrument needed.
9. No limit to size of opening.
10. Broad surfaces of approximation, insuring firm union and preventing leakage.
11. Microscopic examination of border of anastomotic opening shows almost complete absence of connective tissue. (Murphy saw some of the specimens, and said opening would never close.)
12. Mucosa seems to grow quicker over the edge than in methods where edge is covered with irritating connective tissue-producing sutures.
13. Contracted anastomotic openings may be enlarged by this method without cutting into viscera, as suggested and done by Ochsner.

# THE TECHNIQUE OF OPERATION FOR EMPYEMA USED IN VAN HOOK'S CLINIC

By H. M. RICHTER, M. D.
Instructor in Surgery, Northwestern University Medical School

The preliminary preparation of the patient for the operation for empyema of the pleura should be the same as that in routine use in most major operations.

In general, no more time should be lost after making the diagnosis than is necessary for the preparation.

The local preparation:

1. The side of the chest involved should be thoroughly cleansed with soap and hot water.
2. Suds removed with hot water.
3. Alcohol wash.
4. Hot bichloride scrubbing (1-1000).

Scrubbing should be done with a handful of gauze. No time should be wasted between solutions to allow of evaporation and chilling of the body. Parts not involved should also be protected from chilling, which is depressing. During the preparation, the patient should be on his back, well over the side of the table, or with his shoulders raised by an assistant. He should not lie on his opposite side.

### THE ANÆSTHETIC

A general anæsthetic is *never* given in primary cases. For the operation here advised, local anæsthesia is sufficient, preferably by the method of Schleich. The skin should be infiltrated over the selected site, the area being approximately one inch in length. The deeper tissues are then infiltrated in the usual manner.

The injection into the skin and deeper tissues of half a dram of a two-per-cent cocaine solution is also very satisfactory. The technique differs from the Schleich method, in that several minutes (three to five) should elapse after the injection before making the incision; a much wider area will thus be anæsthetized.

### THE OPERATION.

The operation in common use for empyema consists of a rib resection, with the formation of a large opening for drainage of the pleural cavity, on the principle that a large suppurating cavity requires a free incision to drain it properly. This idea involves, however, a distinct oversight of two most important points:

First, That the lung can always in acute cases, and often in chronic cases, be made to fill the space intended for it in a matter of hours to days, depending on the case.

Second, That when pleural surfaces are brought in contact by the expanded lung, suppuration quickly ceases and adhesions form.

To consider the second proposition first:

The endothelium-lined pleura reacts as does the peritoneum to irritation. Adhesions rapidly form when the pus finds free escape. Were a general peritonitis to continue suppurating after drainage is instituted, as the pleural cavity does after resecting a rib and inserting a tube, there would be no recoveries.

Instead, capillarity carries the infectious fluid from all parts of the peritoneal cavity between the loops of bowel, which, lying together, convert the entire peritoneal surface into a series of capillary spaces, to the place of exit, made by the insertion of the drain. Suppuration rapidly ceases and adhesions form.

Similarly, the pleural cavity is converted into a capillary space when the lung is brought up to the chest-wall. The fluid rapidly flows toward the point of exit made by the tube. There is nothing to prolong the infectious process in the pleura, and adhesions are rapidly formed. No suppurating space remains, except just about the tube, which should be shortened to extend just through the chest-wall and then removed altogether.

The expansion of the lung to fill the cavity after the usual operation of drainage depends upon the formation of adhesions where parietal and visceral surfaces are brought in contact during expiration, the contraction of new connective tissues, the partial falling in of chest-wall, due to traction, etc. During forced expiration, the lung in the affected side is slightly expanded because of increased intrapulmonary air tension. This fact has long been taken advantage of by having the patient expire against resistance.

Increased intrapulmonary tension has its complement in lessened tension in the pleural cavity, and several devices have been utilized to diminish tension in the pleural cavity by suction, by means of aspiration (Bryant), automatic flap of rubber (Schede), that allows air to be forced out of the cavity during expiration, coughing, etc., but does not allow air to enter during inspiration, etc.

The following device enables the surgeon to

maintain a minus tension continuously until the lung becomes fully expanded, regulating the degree of tension at will. Extensive pleural adhesions and rapid recovery are thus assured. The device was suggested by Perthes in 1895, and advocated in America by Van Hook, who published his article in 1903. It is in connection with Van Hook's work that I have become familiar with the technique.

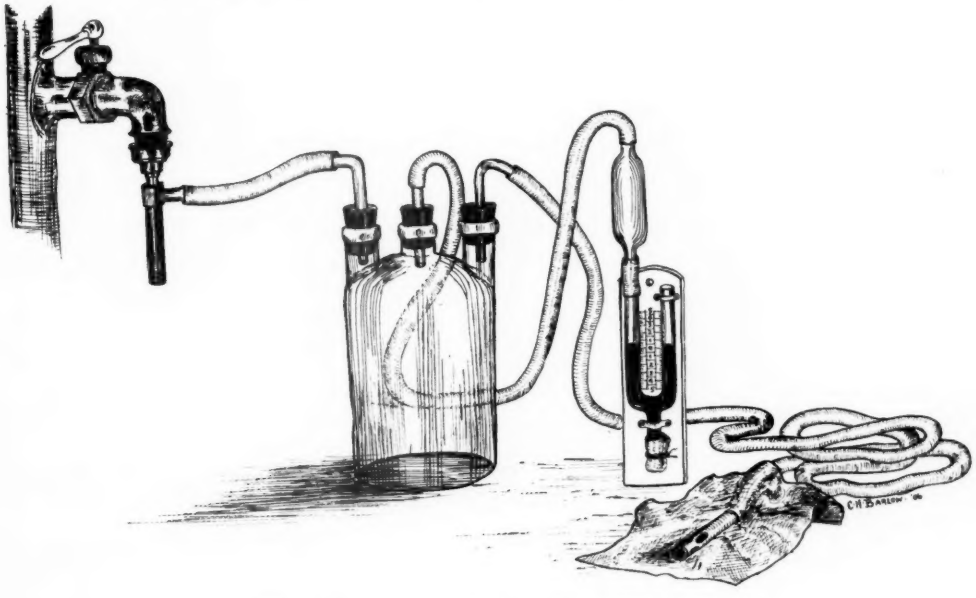
THE APPARATUS

The device consists of a Bunsen pump, a Wolff bottle to take up the discharge, and to which a mercury manometer is attached to measure the degree of tension, and act as a safety-valve against too strong tension, and a drainage-tube passed through a sheet of rubber.

1. An ordinary Bunsen pump can be bought at any supply-house, to be secured to a faucet.

2. A Wolff bottle — three-mouthed—one mouth connected with the pump, one with the tube inserted into the chest-wall, the third to the manometer. The manometer is so arranged that when the tension in the Wolff bottle becomes too low, air is drawn through the manometer-tube; the degree of tension that will cause this to occur is regulated by the height of the mercury in the arms. The tension is measured by the difference in level in the two arms. The bulb in the proximal arm prevents the mercury splashing over into the Wolff bottle.

3. The drainage-tube is prepared as follows: A sheet of rubber dam about eight inches square is perforated in the center, a medium-sized drainage-tube is drawn through, a distance of about two inches, varying with the thickness of chest-wall. A tight joint may be made between tube and dam by means of rubber cement. The end of the tube to be inserted into the chest should be fenestrated. These various parts are connected with tubing, as shown in the illustration.



Drawing of apparatus attached to ordinary water faucet.

THE TECHNIQUE OF VAN HOOK IN DETAIL

The site of choice is the fifth or sixth interspace, anterior to the outer border of the latissimus dorsi. Since the lung rapidly expands and converts the large cavity into a capillary space, gravity is a negligible quantity, and a more dependent site need not be chosen; in fact, site is not an important factor, except that it must be far enough away from the diaphragm to prevent closure of the tube by the ascent of the latter.

*Anæsthesia.* Local anæsthesia is always used — Schleich infiltration preferred.

*Operation.* 1. An incision not over an inch in length is made between the ribs, into the chest cavity. Two or three strokes of the knife suffice.

2. The soft-rubber drainage-tube, previously prepared by fenestrating its end and grasped in a pair of forceps, is inserted in the opening. The tube is connected with the aspiration apparatus as described.

3. A thick layer of zinc oxide ointment is spread over the chest, the rubber dam applied closely, and bandage applied. The zinc oxide insures an air-tight junction.

The patient may leave his bed as soon as his physical condition permits. Using a rather long tube connection, he may be free to walk about the room.

There are certain conditions which interfere with the successful application of this apparatus:

1. Communication with a bronchus. Unless the opening spontaneously closes, it would clearly be impossible to maintain a minus tension in the pleural cavity.

2. Old empyema, where, after resection of ribs and prolonged suppuration, the visceral pleura is converted into a thick leathery coat that will not give. Here, of course, rib resection would be equally useless. One of the extensive resections of the chest-wall would alone be of use. Where the lung *can* expand, the apparatus will shorten the time required.

3. Large masses of fibrin occasionally plug the tube. Where these continue to interfere, Dr. Van Hook has suggested injecting into the pleura one of the vegetable proteolytic ferments. These may be obtained in a practically sterile form. This does not apply to ferments of animal origin, which usually team with many kinds of bacteria.

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# THE TECHNIQUE OF ABDOMINAL HYSTERECTOMY FOR FIBROIDS OF THE UTERUS

By FRANKLIN H. MARTIN, M. D., Chicago

## OPERATION

The operation for abdominal hysterectomy for fibroids of the uterus, from the standpoint of the inexperienced surgeon, may be considered one of the most formidable which surgeons are called upon to perform. As experience can be gained only by witnessing a large number of operations as the immediate assistant to a master, or by the actual performance of operations after a mastery of the theoretical difficulties, I wish to add my small contribution to the study of the subject by describing in detail this procedure to those who may be obliged to do serious work of this character without having had the advantages of large experience.

## OPENING THE ABDOMEN

The abdominal incision for an abdominal hysterectomy should, obviously, be made with the idea of allowing plenty of room for the delivery of the tumor as it has appeared in the mind's eye of the surgeon in diagnosing the case. The incision should be carried from a point below the umbilicus to a point well down to the symphysis. The first incision should be carried to the aponeurosis of the muscles through the entire length of the contemplated final incision. The aponeurses should then be severed well down to the lower end of the superficial wound. The fibers of the rectus muscles, which usually lie immediately below the aponeurosis, unless the incision is exactly over the linia alba, thould next be separated longitudinally by a blunt instrument or the two index fingers of the operator. The abdomen should be opened at the upper end of the incision by grasping the subperitoneal tissue with two forceps in such a way as to elevate the peritoneum into a transverse fold. The knife is then made to sever the subperitoneal tissue until the peritoneum is in view. Now with a scratch of the knife the peritoneum is opened. The opening into the peritoneum is made at the upper angle of the wound in order to avoid any posibility of wounding the bladder, which is frequently drawn well up upon the abdominal wall by buried fibroids. The surgeon's finger should then be introduced into the wound as a guide, and the peritoneum opened down to within an inch of the lower end of the wound. It is unnecessary to go further than this, because of the elasticity of the peritoneum, which will allow it to stretch well down beneath the lower angle of the wound, and the avoidance of cutting the peritoneum below makes a wounding of the bladder less likely.

## OUTLINING THE TUMOR.

The opening of the abdomen may be considered the first step of an abdominal hysterectomy. The next step is the exploration of the tumor. The hand of the operator should grasp the tumor and

rapidly map out its contour, its different centers of development, and its relation to the other organs of the pelvis. One glance at the tumor will indicate whether it is buried beneath the bladder or not. One sweep of the finger to either side will indicate whether it has developed beneath the broad ligament of one side or the other; another sweep of the hand will indicate adhesions of the intestines or the omentum to any portion of the growth; and at the same time great care should be taken to ascertain whether or not the tumor has developed beneath the peritoneum, at other points than in the broad ligaments.

With this general survey rapidly made, the next step of the operation is the placing of protecting gauze sponges in the abdomen. Gauze pads constructed of two or more layers, six by ten inches, to the corner of which is attached a small tape six or eight inches long, should be carefully packed above and beneath the tumor in such a way as completely to wall off the omentum and the intestines from the field of operation. The small tape only should protrude from the abdomen, and should be clamped with small forceps.

### DELIVERING THE TUMOR

The next step in the operation is one which I consider of the most importance, and one which I am surprised to note, in witnessing the operations of other men, is often neglected. I refer to the attempt to deliver the tumor. For this purpose I grasp the tumor at the most prominent point with a large vulsellum forceps. The tumor is then lifted bodily through the abdominal opening, the incision being carefully stretched over the sides of the tumor until it is entirely out of the abdomen, or until it shows by its resistance that soft tissues and peculiar conformation prevent its delivery. The tumor is then held firmly by an assistant while examination is made to discover the cause of the resistance. Without waiting for the completion of the other steps of the operation, if the tumor is found to be buried beneath the broad ligament and the tension of the buried portion upon these ligaments is the cause of the retention, the operator immediately splits the peritoneum over the portion of the tumor which is buried, in order to permit prompt enucleation of that portion of the growth. The broad ligament should be split parallel with the direction of its arteries, in order to avoid wounding these channels. Often after severing the peritoneum the tumor will suddenly yield at one or more points, in the case of different portions of the tumor projecting beneath the peritoneum, and the whole mass, including the uterus, will be delivered outside of the abdomen, with the cervix and the vagina and the remaining portions of the broad ligament as the only attached portions.

The importance of the immediate delivery of a tumor can only be appreciated by those who have attempted to remove a large impacted fibroid without first adopting this bold procedure. Without delivery of the tumor it is impossible to carry out with precision and due alacrity the remainder of the operation.

After the delivery of the tumor, the next point is the ligation of the four blood-channels supplying the uterus and its tumors with blood; viz., the two uterine arteries and the two ovarian arteries. With the tumor out of the abdomen, the ovarian arteries should be tied at a point on the broad ligament outside of the tubes and ovaries. If in tying this ligature it is possible at the same time to include the round ligament which frequently lies in close proximity to the broad ligament, the round ligaments should be included in the same ligature, and with a No. 4 antiseptic catgut ligature these structures should be tied firmly with a single knot repeated at least three times, in order to avoid the possibility of the knot untying. Immediately, then, the sutures should be severed a quarter of an inch from the knot and a pair of lock-forceps placed close to the ligature on the uterine side of the pedicle, and a second pair a quarter of an inch still closer to the tumor, to secure the collateral circulation after the broad ligament is severed between the two forceps, and then the broad ligament should be severed well down to its base. The operator then, with the tumor drawn well to the opposite side, should seek at the base of the broad ligament for the uterine artery. This artery should be grasped with very little other tissue, and the ligature carefully placed beneath it, tied, its uterine side grasped with another forceps, with a forceps to care for the recurrent circulation, and the broad ligament severed well down to the vault of the vagina.

After each severance of the tissues between the forceps, the operator should notice whether the arteries are actually in the grasp of the forceps, as this will indicate that they have been ligated.

The tumor is now turned to the opposite side and the uterine and ovarian arteries of that side secured in like manner.

The next step in the operation is the severance of the tumor from its attachment. If the fibroids do not involve the cervix, that part may be left as a pedicle, as by so doing the vagina is maintained in normal length, and in its normal condition.

The tumor is severed in the following way:

The peritoneum, at the point of its duplicature between the uterus and the bladder, in front of the

tumor, is severed, and the portion covering the bladder is pushed well down until the junction of the cervix and the vagina is reached. The peritoneum is then severed posterior to the tumor at the point corresponding to the severance of the peritoneum in front. The tumor is now held well up, and with a sharp knife the mass is severed from the cervix in such a way as to leave the center of the cervix an inverted cone with the cervical canal as the apex of the cone and the outer edges of the cervix as the circumference of its base.

The tumor is now removed, and the uterine canal is rendered antiseptic by traversing its length with an applicator armed with cotton saturated with 1:50 bichloride of mercury solution, or pure carbolic acid afterwards removed by an application of 95-per-cent alcohol. This is repeated until the canal is considered perfectly antiseptic.

### CLOSING THE STUMP

By means of inversion sutures placed on the outer margin of the cervix, the raw surfaces representing the inverted cone are rolled together in such a way as to cover completely the cervical canal and make a perfect closure of the cervical stump.

### CLOSING THE PERITONEUM

The next step is closing the peritoneum, representing the anterior and posterior layers of the broad ligament, and bringing the edge of the peritoneum severed in front of the cervix to that severed upon its posterior surface. This is accomplished by using a running suture of strong catgut, beginning at the point of the ligation of the ovarian artery on one side, after the removal of the forceps placed for the control of the ligatures, and carrying it to the center of the cervix. Another suture is employed to close the opposite side of the broad ligament, and the two, meeting in the center over the cervix, are secured in such a way as to bury the cervix completely beneath the two peritoneal coverings.

### COMPLICATIONS

The most common complication, and one which will cause much trouble to an inexperienced operator, is the extension of the tumor into the folds of the broad ligaments. This complication must be grappled with at the time an attempt is made to remove the tumor. Tension upon the tumor, of necessity, emphasizes the fact that a portion of the growth extends beneath the broad ligament. As tension is made, the subperitoneal development will be drawn well up into the wound, and its peritoneal covering, which prevents its complete delivery, will be tightly stretched over its surface. It is at this point that the peritoneal covering must be boldly split in a direction parallel with the broad ligament. As the thin peritoneum is incised and still further tension made upon the tumor, the subperitoneal mass will be seen gradually peeling out from its bed, and when it is finally delivered the portion of the broad ligament covering it will collapse into the bottom of the pelvis. Sometimes two or more of these subperitoneal fibroids, which have developed beneath the peritoneal broad ligament and occasionally beneath the peritoneum at other points, will exist to complicate an otherwise ideal operation. No time should be wasted in attempting to deliver them until first the peritoneum beneath which they have been developed has been split. As a rule, after these centers of development have been enucleated from their beds the case will become a normal one for the subsequent operative work, as the tumor will have brought the broad ligaments well up into the wound, where the four blood-channels may be ligated, as I have described above for a normal case. If it is discovered that the tumor cannot be delivered completely, it may be necessary in a few cases to sever the broad ligament transversely. In such cases, if it is found difficult to ligate the part of the broad ligament containing the blood-vessel, the ligament should be clamped firmly with large lock-forceps — two pair—one for the artery and a second pair for recurrent circulation from the tumor and the ligament severed below them. When the tumor is delivered, it will be found easy to ligate the portion of the ligament containing the ovarian artery.

This same maneuver should be carried out, too, when inflammatory stiffening of the peritoneum and appendages makes the immediate delivery of the tumor difficult.

Occasionally, tumors will develop beneath the peritoneum, and extend so far that an intestine will be stretched more or less tightly over some portion of the growth. These cases should be treated on the same principle as that applied to the tumor developed beneath the peritoneum. By severing the peritoneum of the tumor at a considerable distance from the intestine, the mass may be enucleated from beneath the intestine, leaving its blood-vessels and mesentery intact, and then the operation may be proceeded with as in a normal case.

A complication of unusual difficulty, in point of manipulation, is that in which a fibroid develops low on the anterior wall of the cervix in such a way as to grow beneath the bladder and elevate that viscus well up on the anterior wall of the uterus. Here great care should be taken to enucleate the tumor in such a way as not to interfere with the integrity of the bladder. As the ureters from the

bladder pass beneath the broad ligament at either side of the cervix, great caution must be excercised not to injure these tubes, and for this reason the enucleation should be carried out with blunt dissection and carried close upon the tissues of the buried tumor until the neoplasm is gradually isolated by this close dissection, and grasping it with the ulsellum, is finally delivered in a way to allow the bladder to fall back into its normal position.

*In enucleating fibroid tumors from beneath the peritnoeum, everywhere, one rule should be practised and carefully carried out; viz, to keep close to the tumor.* If tumors are enucleated from below the peritoneum at other points than from beneath the broad ligaments, the slits in the membrane through which the tumors are delivered should be carefully closed with a running catgut suture.

The finished operation of abdominal hysterectomy for fibroids should leave the peritoneum of the pelvis completely closed, and the cervix representing the stump of the operation well buried beneath that serous membrane. The operation, when completed, should show the bottom of the pelvis smooth, free from bleeding-points, and with the peritoneum intact at all places.

TOILET OF THE PERITONEUM

The toilet of the peritoneum and the closure of the wound are the last steps in this operation. After the removal of all blood from the bottom of the pelvis, the large gauze packs should be carefully removed; the intestines should be replaced in the bottom of the pelvis, and the omentum spread over the surface beneath the wound.

CLOSURE OF THE WOUND

The wound is then closed in the following manner: The peritoneum is caught up and rapidly whipped together with a running catgut suture of No 2 pyoktaninized catgut. With dry sponges all fluid is now removed from the wound, and the aponeuroses covering the muscles are closed with No. 4 pyoktaninized running suture. The skin is next closed with a subcutaneous suture of silver wire, securing the ends by compressed shots if the fat layer is thin; and a running closure suture of No. 4 chromic twenty-day catgut, which includes the whole skin and fat layer, penetrating the skin a half-inch from its margins and a half-inch apart if the fat layer is thick. This makes an accurate approximation of the broad fat layer, and makes a comfortable adjustable suture. Over the wound is placed an abundance of fluffy sterile gauze. Over this are placed liberal gauze packs, and the whole is firmly bound down with strong strips of adhesive plaster, and over this, in turn, is placed a strong canvas band.

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# SURGICAL RECORDS IN THE CLINIC OF DR. J. B. MURPHY

By VICTOR L. SCHRAGER, M. D., Chicago

More and better surgery is done in the United States than in any other country in the world. This is partly due to the unusual skill of the American surgeons, partly to the perfect hospitals and properly trained nurses, and to a great extent to the higher intellectual standard of the American patients belonging to the lower and middle classes, who apply to the surgeon in time.

There are other reasons that I shall not enumerate. If this is the case,—if the New World is a strong competitor of the Old World in surgery, why is it that surgical literature of this country is rather meager? Why is it that when we want to write an article on any surgical topic we are compelled to consult the French, German, British and Italian literature? We all know that "modern surgery" is just as young in Europe as it is in America. I could give several reasons, but I will deal with only one, apparently the most insignificant, and one to which surgeons have paid little attention, as they probably consider it beneath their dignity.

The object of my present unpretentious article is, to call attention to the fact that there is little or no clerical work done in connection with surgical clinics, in United States, to promote surgical bookkeeping, if I may use this expression. Much of the surgical material, which could be utilized for publication or could serve in the compilation of statistics is wasted, because the records are neither complete nor easily accessible. If no systematic records have been kept, and the surgeon desires to review his cases for a period of five, ten, or fifteen years, he must necessarily resort to the individual histories of the patients for that period of time. The disadvantages and the impracticability of such a procedure need no further comment.

## MERCY HOSPITAL

No. of history on file..... Surgeon .....
NAME*..... Residence..... Nationality.....
Nativity..... Sex..... Age..... Civil state .....
Occupation .....
Admitted..... Discharged..... No. of days in the hospital.....
Result †.....
If death, definite or approximate cause of death.....
DIAGNOSIS* .....
Résumé of clinical findings preceding the operation: .....
.....
.....
Operation (date)..... Operator ..... Assistants ..... Internes.....
Anæsthetist ..... Anæsthetic..... Quantity ..... Duration .....
Tolerance of anæsthetic ..... Emesis.....
Nature of Operation, procedure, technique.....
.....
.....
Special procedure or method.....
.....
Difficulties or accidents during operation.....
.....
Duration of operation (from the time of first incision until closure of the wound) .....
Pathology and topographical relations, as seen by the surgeon while operating.....
.....
.....
.....
Suture material and ligature..... Drain.....
Dressing..... Apparatuses, mechanical appliances, new instruments used.....
.....
Résumé of objective and subjective findings in the first week following operation (" post-operative course ").....
.....
.....
.....

| Résumé of | Temperature | Pulse | Respiration | Urine | Blood | Miscellaneous |
|---|---|---|---|---|---|---|
| *a.* Preceding operation | | | | | | |
| *b.* Following operation | | | | Post-anæsthetic casts? | | |

Post-operative care .....
.....
.....
Subsequent course, special events, complications.....
.....
.....
.....
.....
Condition of wound..... After.....days.
Condition of drain and day of removal.....
Stitches removed..... Healing of wound, union.....
.....
Reference to previous operation or operations.....
Reference to subsequent operation or operations.....
Pathology as seen by the pathologist.....
.....
.....
.....
No. of record at the laboratory..... Smears.....
Cultures .....
Inoculations..... No of preserved specimen.....
No. of slide .....
Microscopical diagnosis (where filed) .....
Post-mortem .....
.....
.....
.....
Pathologist in charge.....
Drawings ‡ ..... Photographs ‡..... Skiagrams ‡..... Supervisors.....
.....
.....
Was case ever used for publication?..... Where, when?..... By whom?.....
Information obtained either through correspondence or personal, concerning condition of patient since he left hospital (where filed).....
.....
.....
.....
Name of doctor who made the statements on this page .....

* Use red ink. † Use one of the following words accordingly: Dead, unchanged, slight improvement, improvement, marked improvement, cured.
‡ Where to be found and No.

The accompying model of a "surgical record" has been accepted by Dr. J. B. Murphy and is in use in his clinics at Mercy and Presbyterian hospital.

The same represents a page of a book of a thousand pages, at the end of which there is a separate index for the patients' names and the various surgical affections. The index should be prepared by the surgeon or interne on the blank pages reserved for it at the end of the book. It is desirable to add the cases when recording them, so that the total number shall be known immediately when consulting the index. In Dr. Murphy's books the sheets are printed on both sides. I think, however, that it would be preferable to have them printed on one side only, the blank one serving for special notations. I would also suggest to paste on this blank page the letters written to the surgeon by the patients after they have left the hospital, or abstract the letter and record the details in brief.

The advantages and necessities for such surgical record are:

1. By keeping a complete index of names and surgical affections at the end of the book, it enables the surgeon to know at any time the number, results, and nature of cases he has had within a certain period, without consulting the histories.

2. A clear, concise idea of a certain surgical affection from its clinical and statistical points of view can be obtained in a few minutes by consulting the index of the book.

3. It supplies valuable information to the surgeon himself, and to others who apply to him for clinical and statistical data.

4. It lays the foundation of correct surgical statistics.

5. It facilitates matters considerably when the hospital prepares the annual "hospital report." It is known to all of us that the interne doesn't like "the job" of preparing the annual hospital report, because it requires a considerable effort, for which he has no moral compensation.

The main objection to this surgical record is apparently the time and effort required for recording the details. As to the time, I wish to say that one who has followed the case succeeds in filling in the necessary details of the case in about fifteen minutes. As to the labor expended, I might say that it is fully compensated, for I know of no better opportunity for the interne than that of being able to review a case from the time of entrance into the hospital to the time of discharge. By reading the text of my surgical record, the reader has probably noticed the expression, "Pathology and topographical relations as seen by the surgeon." If I am not mistaken, this is an innovation of Dr. J. B. Murphy. It consists of dictating to the junior interne, during the operation, the topographical relations of the exposed parts or organs, and their macroscopical aspect before they are removed. The notes taken by the interne constitute a most valuable addition to the history.

"Information obtained, either through correspondence, or personal, concerning condition of patient since he left the hospital." It is of primary importance to know what becomes of the patient after he leaves the hospital. Very frequently the surgeon is informed of this, either by the patient or his attending physician. Such information is very precious, and should be recorded briefly in the blank space; the ultimate result of a certain surgical affection is indispensable for correct statistics. Most of the French and German surgeons make a special effort to follow their case for a considerable period of time; at regular intervals, circular letters are sent them, and the information thus obtained is recorded with particular care. Would it be justice to the surgeon to state on the records of a case of primary or secondary suture of nerve or nerves that the patient was discharged "unimproved" or "unchanged," since we know that restoration of sensation, and especially of motion, occurs in from several weeks to several months and even years? On the other hand, is it justice to medical and surgical statistics to state, shortly after a posterior gastroenterostomy for gastric ulcer, for example, that the patient was discharged "cured," since we know that gastric ulcer may recur, that posterior gastroenterostomies may be followed by unpleasant post-operative adhesions, and especially since gastric ulcers in the region of the pylorus may undergo carcinomatous degeneration?

In connection with the surgical record, I would like to say that it is very desirable that the chief surgeon or his immediate assistant should record the diagnosis on the history and the surgical record. Not infrequently have I seen the surgeon protesting against the diagnosis recorded by the interne. Medical nomenclature is not absolutely definite, and every surgeon has his own way of describing pathologic findings, of naming a certain affection. Internes come and go, and they cannot identify themselves with the views and conceptions of the surgeons.

In conclusion, I hope that my remarks, together with my model of a "surgical record," will be considered by the surgeons to whom I unpretentiously submit them.

# EDITORIALS

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MARCH, 1906

## THE PRESENT STATUS OF THE SURGICAL TREATMENT OF CANCER OF THE UTERUS

In the last decade the wide removal of the pelvic contents in cases of uterine cancer has enabled the pathologist to study carefully the rapidity with which the carcinoma extends to adjacent parts, and also to determine the localities most frequently involved. It has been demonstrated that what we must most fear is the extension of the growth into the parametrium on one or both sides of the uterus. It has also been shown that the pelvic lymph-glands are often invaded.

It is clearly evident that an abdominal operation is the only one that will enable us to remove satisfactorily any growth that has spread out into the broad ligament. The operation of Wertheim, or that recently employed by Mackenrodt, is the most inviting.

Wertheim's operation is rendered much easier by the employment of the Poten incision where the peritoneum is incised transversely and then drawn back and tacked to the pelvic brim, thus holding the intestines back.

In all abdominal operations for cancer there are three serious dangers:

1. Infection from the carcinoma.
2. Severe hemorrhage.
3. A prolonged operation, with sudden collapse of the patient.

The careful curetting or burning of the growth previous to operation, followed by the local applications for twelve hours of a pledget soaked in formaline solution will, as Mackenrodt points out, render the tissue much harder, and also diminish the tendency to infection. We have used these pledgets of formaline for over two years with much satisfaction.

With the excellent exposure in the operation of Wertheim, and especially in that of Mackenrodt, the blood-vessels are clearly seen, and consequently the liability of hemorrhage is much less than in the older operations.

One of the great dangers is sudden collapse of the patient on the table if the operation is unduly prolonged. Many of us have seen the patient do well for two hours, and then the pulse suddenly became weak and thready, and the patient in a state of collapse. The surgeon should be thoroughly familiar with every anatomical detail before undertaking such an extensive hysterectomy, in order that not a moment be lost. Furthermore, he will do much better work if it is his first operation for the day. Rapidity in operation is second in importance only to the thoroughness with which it is done.

We have employed Wertheim's operation with much immediate satisfaction, but the rerecent results reported by Mackenrodt, Sampson, and others certainly indicate that all the parametrical tissue should be shelled out, and

we should not be surprised if Mackenrodt's operation would, in the near future, be very frequently employed. Mackenrodt's horseshoe-shaped incision through skin, fat, and muscle down to the peritoneum does not impress one favorably, but when we see the excellent exposure he obtains, and how materially he may shorten the operation, the advantages seem to more than outweigh the deleterious effect of severance of the recti.

It is a mooted question as to whether the lymph-glands should be removed or not. It would seem advisable to continue their removal for a few years more, however, if the patient is in good condition, in order that the question be settled once for all.

We cannot see how vaginal hysterectomies can be longer advocated, except in cases of very fat individuals, where an abdominal operation is not feasible.

While the technique of these operations has been worked out chiefly by German gynecologists, it must be a source of much satisfaction to see the excellent contributions on this subject made by our own colleagues, Clark, Ries, Werder, Sampson, and others.

The early diagnosis of cancer of the uterus is the key-note to the situation. It is appalling to see how many came too late for operation, and yet the number of operative cases is increasing every year. In Germany, Winter has done excellent missionary work in having the general physician enlightened as to the early symptoms and as to how the diagnosis may be made. The midwife has also been stimulated to report all suspicious cases. In this country, the American Medical Association has appointed a committee to draw up plans relative to the dissemination of knowledge concerning cancer. The physicians are to enlighten their patients as far as possible; and then it is proposed to have a censored press bureau which shall write popular articles on the subject, these to appear in suitable lay journals, minus the author's name.

With the more thorough understanding on the part of the laity, and the appreciation of the fact that cancer in its early stages can be cured, and with the ever-improving techinque, the permanent cures in cases of cancer of the uterus will greatly increase. As we all know, the final results in operations for cancer of the body of the uterus are excellent.

THOMAS S. CULLEN, M. D.

## THE MATERNAL-IMPRESSION SUPERSTITION IN AMERICA

Ballantyne, in his *Antenatal Pathology and Hygiene*, says that from 1839 to 1900, 170 papers dealing with the maternal-impression theory were published in American journals, and that many eminent men, such as Fordyce Barker, Samuel C. Busey, William Goodell, Matthew D. Mann, R. A. F. Penrose, and A. F. King, were among the supporters of the theory. At the last meeting of the American Medical Association in Portland, Oregon, E. T. Shelly of Atchison, Kansas, read a short paper on the subject (published in the *Interstate Medical Journal*, vol. xii, No. 12, 1905, "The Maternal-impression Superstition, and Why It Survives"), in which he makes quotations from recent American text-books on obstetrics that show a surprising tendency toward a credulous acceptance of this old superstition.

This indictment of American teachers of obstetrics for complicity in propagating among medical students this old, absurd, and in some respects harmful, superstition may well receive a little serious consideration. The suggestion of Shelly that the retention of this superstition in the text-books may be due to the fact that they are gotten up largely by "hack compilers" may be correct, but is hardly complimentary to the responsible authors whose names appear on the title-pages. It is, however, very hard

to believe that these men can subscribe knowingly to statements bearing explicit or implied support to this venerable but exploded theory.

It is to be hoped that the occasion for this indictment of Ballantyne and Shelly will be done away with upon the next revision of the text-books referred to. Aside from the discredit to the American medical profession which such a charge causes when its truth is admitted, the continuance of the superstition leads to two evils, either of which should rouse us from our careless and unscientific attitude. First, as Ballantyne points out, the theory has had a maleficent influence on antenatal pathology. Many instructive cases of fœtal disease and deformity have been lost to science because the observer has been interested only in finding a far-fetched resemblance of the morbid fœtal condition to some animal, vegetable, or mineral, and has overlooked all anatomical or pathological details.

Secondly, as Shelly and others have shown, the prevalence of the superstition tends to cause much unnecessary anxiety and dread to expectant mothers. The duty of the physician to protect and shield his patient from this anxiety is clear, and this duty should be emphasized by the leaders and teachers of the profession.

C. S. Bacon, M. D.

# TRANSACTIONS OF SOCIETIES

## TRANSACTIONS OF THE CHICAGO GYNECOLOGICAL SOCIETY

Stated meeting, December, 15, 1905.

The President, Dr. Frank T. Andrews, in the chair.

### Cranischisis

Dr. Henry F. Lewis: I have here a teratological specimen. It belongs to the class of craniorachischisis. In this instance the defect is in

Fig. 1.

the frontal bones. This child is a week old, it having been born normally and quickly. The presentation was vertex, and we were uncertain at first what the position was. No anterior fontanel could be felt; the posterior fontanel came directly in the middle. The head runs up straight from the neck, and the occiput is not at all prominent. There is a soft prominence noticeable in

Fig. 3.

the forehead, above the bridge of the nose. The eyes are rather far apart. The sagittal suture can be felt running as far as *A;* the coronal suture is away forward, almost where the forehead belongs *C;* the anterior fontanel is very large, *D;* and the anterior fontanel extends away down here to the nasal bones, *E*. There is also some defect in the nasal bones. There is a projection forward of the brain, probably — at least of the brain coverings, and a large soft area can be felt at the

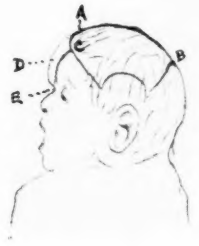


Fig. 2.

Fig. 4.

Fig. 5.

anterior fontanel in this position (indicating *D*). The margins of the two parts of the frontal bone are widely separated. (Fig. 4, *D*.)

A defect in the frontal bone with more or less protrusion of the cranial contents through the forehead is called " proencephalus." Each portion of the frontal bone is distinctly smaller than normal. The whole brain in this case seems smaller than normal, and doubtless there is a considerable defect of the anterior lobes of the cerebrum. Another anomaly is that there are six digits upon the left hand. (Fig. 5.)

As to the measurements: Biparietal, 10 cm.; bitemporal, 9.5 cm.; occipitomental, 13 cm.; occipitofrontal, 11 cm.; bisacromial, 11 cm.

### Ovarian Cyst with Twisted Pedicle in the Puerperium

Dr. Rudolph W. Holmes: I wish to present briefly the history of a patient with a large ovarian cyst with twisted pedicle in the puerperium for Dr. O. J. Waters, the operator. Mrs. W., æt. 29, para iii. She has had two normal pregnancies and labors, both of the labors being easy and rapid. The last child is now four years old. The patient had been in good health this third pregnancy, but she thought her abdomen was larger than in either of her previous pregnancies. She entered the Passavant Memorial Hospital on February 22, 1904. No special abdominal examination was made beyond establishing the fact that the position of the fœtus was that of an L. O. A. Labor began about eleven P. M., March 2d. The baby was born at three o'clock the next morning. The interne, in the absence of Dr. Waters, delivered the child. The second stage was very short, the placenta following the child within fifteen minutes. A laceration requiring four stitches was repaired. On the second day the temperature rose to 101°, falling after a movement of the bowels. After the fourth day the temperature was normal, and so continued until the complication arose. The abdomen remained large, making the palpation of the uterus somewhat difficult after the sixth or seventh day. Enemata alone were employed during the remainder of the lying-in period. The stitches were removed on the eleventh day. The patient was allowed to leave her bed on the fourteenth day, March 16th. That same evening, she had some pain in the right pelvic region, which was relieved by morphia, gr. ⅙ and hot applications; at this time the temperature was normal. During the next day the woman was fairly comfortable, with applications of a hot compress; that evening the temperature was 100°, and the pulse 78. On the 18th of March, after a night of little sleep, she had another attack of severe pain, requiring morphia.

An examination of the abdomen showed considerable tympanitis over the whole abdomen, and some dullness in the right side, which dullness, later in the day, was transferred to the left side. The bowels were obstinately constipated. Cathartics and enemata were of no avail. That evening the temperature was 102°, and the pulse 102. A doughy mass was felt in the left pelvic region, per vaginam and rectum. The leucocytic count was 38,000. During that night and the next day, pain was less intense, nausea and vomiting persisting. The bowels could not be moved, and the patient was much distressed by eructations of gas, but no flatus was passed. By four P. M., March 19th, the pulse was 106. The diagnosis of ovarian cyst with twisted pedicle was made; the operation undertaken at five P. M. the third day following the first attack. A large (at least a half-gallon) ovarian cyst of the right side was found transposed to the left half of the abdomen, lying over the descending colon. The cyst-wall was dark red, and the cavity was filled with bloody fluid. The pedicle was found with a double twist. After removal the abdomen was closed without drainage. By the fourth day the temperature and pulse were normal. The leucocytic count on the day after the operation was 7,000.

### Ovarian Cyst with Twisted Pedicle in Pregnancy

I have the privilege of reporting this case through the courtesy of Dr. E. J. Brougham, who asked me to see the patient with him. Mrs. S., æt. 23, para ii, the first pregnancy terminating in an abortion of a month or six weeks. She began menstrual life at 17; the periods recurred with a 28-day type; the flow lasted 3 days, with no real menstrual pain. She was married August, 1903, and the abortion occurred last March. Her last menstruation was June 20, 1905. As a small child, she had had occasional attacks of bi-inguinal pain; at times this pain was so severe that she had difficulty in arising from a chair. These pains, in a few years, disappeared, only to recur after menstrual life was established. Thereafter the pain was largely localized on the right side, with perhaps an extension down the right leg. On the afternoon of December 4th the woman was seized with severe abdominal pain, nausea, and some emesis; when her physician was called at four P. M. the pulse was 106, and the temperature 99°. The general distress continued during the night and next morning. At noon she was admitted to the hospital with the pulse and temperature of

the preceding afternoon. At two o'clock I saw the woman with Dr. Brougham. Pregnancy was established beyond peradventure by feeling fœtal parts, although the heart tones were not heard. The fundus uteri was found displaced to the left half of the abdomen; on the right a mass was distinctly palpable and visible, which mass extended under the right costal arch and liver; between the uterus and tumor a distinct sulcus was evident to the eye and touch. Vaginally, the pouch of Douglas was filled by a firm, yet slightly fluctuating (?) tumor which pushed the cervix under the pubes. As she was better than when she was admitted, an expectant course seemed advisable to Dr. Brougham. The next day pain recurred and the temperature rose to 100°. At three o'clock Dr. Brougham decided to operate.

On opening the abdomen, the cyst was found to be not only to the right of the uterus, but also largely covered the posterior aspect of the uterine body and fundus. In fact, the cyst was in such relation to the uterus that at a superficial glance it almost could be mistaken for the liver; this was more probable from the marked discoloration of the cyst-wall, due to the torsion of the pedicle and resulting interference with the circulation. On removing the cyst, no difficulty was met with; no adhesions were present. The enormously congested tube and ovary were found lying in the cul-de-sac. In this specimen, also, a double torsion of the pedicle was noted. This torsion undoubtedly was of some duration, and only when the growing uterus had been displaced had the pedicle twists been drawn taut, with the necessary interference with the circulation. For the twenty-four hours succeeding the operation there were active uterine contractions at irregular intervals; after the second day the course of the convalescence was uneventful.

Dr. T. J. Watkins reported two cases of Cæsarean section as follows:

## I. Cæsarean Section for Dystocia Due to Uterovesical Fixation

I regret that I have not had the time to bring the statistics of complications during labor following uterine suspension and fixation down to the present date.

Martin (*American Journal of Obstretrics*, vol. xlix, No. 5) collected from the literature 425 cases of pregnancy following ventral fixations and suspensions which showed 116 abnormal labors. Cæsarean section was performed in eight of them. Of the 116 cases there were 7 maternal deaths. Lynch[1] reviewed the literature to date and found 21 cases of Cæsarean section performed for complications resulting from suspensions and fixations of the uterus. He found a report of ten cases of rupture of the uterus which occurred as a result of these operations.

Clark and Bowley (*Johns Hopkins Bulletin*; March, 1905) report a case of rupture of the uterus during labor following ventral suspension. Dr. Mary Almira Smith (*American Journal of Obstetrics*, vol. li, No. 4) reports a case of Cæsarean section after ventral fixation. The complication found upon operation was an adhesive band 10 cm. long, 3 cm. wide, and 1 cm. thick, which was firmly attached to the abdominal wall and the uterus, rendered the uterus almost immovable, and twisted the uterus on its axis. The attachment of this band to the uterus was about two inches posterior to the fundus, and was attached the whole length of the abdominal scar.

Mrs. K., age 29, was referred to me at Wesley Hospital by Dr. Felmlee on October 3, 1905. She had been operated July, 1903, for retroposition of the uterus, and the operation consisted in a vesico-uterine fixation. A flap of peritoneum had been dissected up from the uterovesical space and had been sutured to the fundus of the uterus; the left ovary had been resected for hæmatoma.

Following the operation, she had some febrile disturbance, and for three days her temperature varied from 100° to 102°. Following this, recovery was practically afebrile. She left the hospital on the twentieth day after the operation.

I was unable to learn whether there had been any suppuration of the abdominal wound or not, but, judging from the afebrile temperature after the third day, and from the fact that she was up and about and left the hospital on the twentieth day, it is probable that the abdominal wound did not suppurate. She gave the history of having enjoyed good health following the operation. Her last menstruation occurred ten months previous to admission to the hospital. The patient says that she felt life at 4 to 4½ months' pregnancy, dating from the last menstruation. She was taken with labor pains at the end of nine months; that is, one month previous to admission to the hospital. These were intermittent and regular, but not severe, and soon subsided. Following this she was fairly comfortable, except for some distress in the lower abdomen and backache. Labor pains began at three A. M. October 3, 1905, and recurred about every fifteen minutes.

She was admitted to the hospital at noon, and was then having pains about every three minutes. Patient stated she had been passing some " blood and water " from the vagina for one day. Vaginal

[1] Montassch. f. Geburts. und Gynäk., bd. xix, h. 4.

examination showed the cervix displaced upwards and backwards at about the level of the promontory of the sacrum, was slightly dilated, and considerable thick tissue could be felt anterior to the cervical opening. The head of the child was well engaged and was pressing the anterior wall of the uterus downwards. Examination during a labor pain showed that the pressure was exerted upon the anterior wall of the uterus, and produced little or no rigidity about the cervix. The general condition of the patient was excellent; there was active fœtal movement and the fœtal heart tones were normal.

After the usual preparations, the patient was anæsthetized and an abdominal section was made. On opening the abdomen, the anterior wall of the uterus at the place of the insertion of the right round ligament was found to be only about two inches above the pubes; the left round ligament was imbedded in adhesions throughout its entire extent, and extensive adhesions covered the lower part of the anterior wall of the uterus, extended over the bladder, and were attached to the lower angle of the abdominal incision. The upper border of the adhesions to the uterus made an oblique line from a point apparently a short distance above the attachment of the left round ligament to a point about an inch below the insertion of the right round ligament; they completely covered the bladder, and apparently obliterated the entire space below a line drawn from the lower angle of the old incision to the upper border of their attachment to the uterus, as described above. A longitudinal incision was made through the uterus and the child and placenta were delivered. The bleeding from the uterus was moderate in amount. The uterine incision was closed with interrupted chromacized catgut sutures and the serous surfaces were approximated by a fine continuous catgut suture.

No attempt was made to limit the bleeding by compression of the broad ligaments or by squeezing the body of the uterus; procedures which, I believe, are usually harmful. The uterine appendages were normal; there were few omental adhesions to the abdominal cicatrix. It was interesting to note that the uterine walls appeared no thinner than is usual in pregnancy at term, although the development occurred chiefly in the posterior wall of the uterus. The abdominal incision was closed in the usual manner, and the patient returned to bed in good condition. The child — a girl — weighed ten pounds, was especially free from cyanosis, and respirations promptly began. The patient made an afebrile recovery, was up on the twelfth day, and left the hospital on the fifteenth day. Judging from the date of the last menstruation, from the time the patient felt life, from the occurrence of the apparently regular labor pains at the end of nine months, and from the size and development of the child, it would seem that the case was one of delayed labor, the child being delivered at the end of ten months.

The extent and location of the adhesions indicate that an infection occurred at the time of the fixation. The presence of the increased temperature, ranging from 100° to 102° for three days following the operation, is very strong evidence that a slight infection occurred. It is, I believe, entirely proper to assume that the adhesions were more the result of the infection (inflammatory exudate) than of the fixation. This is probably true of most of the cases of dystocia following uterine fixations and suspensions.

### II. A Porro Operation for Pregnancy Complicated by a Large Suppurative Syphilitic Mass in the Pelvis

Mrs. B., age 28, was referred to me by Dr. E. S. Stewart, July 18, 1905, at Provident Hospital. About four years ago rectal symptoms occurred and a rectovaginal fistula resulted. She was operated twice for this fistula, but without success. The fistula, however, finally closed spontaneously. The patient became pregnant in January, 1905, and about two or three months ago the rectovaginal fistula recurred, and she also had an ischiorectal abscess. The patient was anæsthetized 1½ months ago, and a large mass was found about the rectum, posterior to the uterus. The rectum contained a stricture, and a large abscess was found posterior to the rectal wall. The stricture was dilated and free drainage established. When seen in July, patient was very much emaciated, had a continuous temperature of from one to three degrees, and much of the fæces mixed with pus escaped through the vagina.

Examination showed that she was about six months pregnant; a large mass in the pelvis, posterior to the uterus, and a large rectovaginal fistula between the rectum and vagina. There was a profuse discharge of pus from the rectum and vagina. The patient was continuously getting worse; there was some question as to whether the pregnancy should be terminated or whether an attempt should first be made to establish more perfect drainage. It was feared that any operative interference would bring on labor, which would almost certainly be followed by fatal sepsis. It was finally decided to do a Porro operation, as a Porro operation was preferable to a Cæsarean section, on account of less danger of a puerperal

sepsis. A Porro operation was easily made; the child died soon after delivery. The patient's symptoms following were about the same as before the operation. The abdominal wound healed by primary union. Two weeks after her operation, an effort was made to establish more perfect vaginal drainage, and pockets of pus were opened about the rectum, through an incision in the posterior vaginal fornix. The inflammatory mass was an extensive extraperitoneal infiltration about the rectum. Although good drainage seemed to be acquired, the purulent discharge continued very large in amount, and the septic symptoms were not lessened. The patient gradually lost strength, and died August 11, 1905, from the effects of the chronic suppurative disease in the pelvis.

This case is interesting on account of the peculiar complications to pregnancy; on account of the recovery from the operation without suppuration in the wounds, notwithstanding the extensive pelvic infection.

### III. Case of Cæsarean Section—Post-mortem —Living Child

I have neglected making a formal report of this case, as I hope to exhibit the child to this society at some future date. As yet, I have been unable to obtain consent to do so. On May 15, 1904, I saw Mrs. McC. with Dr. David O'Shea. The patient was a primipara who had had an apparently normal pregnancy. Frequent examinations of the urine during gestation gave negative results. The patient was taken with a very severe headache about 6 P. M., May 15, 1904, when she called Dr. O'Shea. This was soon followed by severe puerperal convulsions. When I saw her five hours later, she was comatose and considerably cyanotic. While preparing my hands to make an examination, she died. A hasty examination of the heart showed an absence of pulsation. A Cæsarean section was immediately made, and a girl baby, weighing about eight pounds, was rapidly delivered. The child was easily resuscitated. I have never seen a child delivered by Cæsarean section which was less cyanosed and which was more easily resuscitated. The uterine and abdominal wounds were rapidly closed; artificial respiration was continued during the operation, and attempts made to stimulate the heart, by injections and punctures, without success. The child is living, is well developed, and is in excellent health.

#### Cæsarean Section

Dr. Rudolph W. Holmes said: I wish to report this case, not from any particular pleasure I have in doing so, but because I believe deaths should be reported, just as much as our successful issues.

Mrs. L. was admitted to the Presbyterian Hospital August 22, 1905, at 5 P. M. At 11 o'clock that evening she began to have weak and intermittent uterine contractions. These pains would perhaps continue for an hour or two, then cease for some hours. This condition continued during the whole of the 23d and the morning of the day following. Possibly the contractions during the night of the 23d were stronger than they had been previously. I saw the patient first about 10 o'clock on the 24th, in the absence of Dr. Webster. I ascertained that the patient had given the history of being perfectly well in the years past, with the exception of some years ago, when a New York surgeon had removed both ovaries and tubes, and made a ventral fixation. She was married twice; the first time when not more than a girl. The fruits of this marriage were three children, all very small babies, which were born spontaneously. This last baby, which I delivered, was the largest she had had. Her last labor was 15 years ago. Some ten months ago she again married, but continued her occupation of cook. During this pregnancy there was no constipation, no bladder disturbance, no œdema. The heart was normal, as were also the lungs.

The uterus reached almost to the ensiform; the ovoid was transverse; the child presented in a scapula right anterior position. The pelvic measurements were: Spines, 24; crests, 25.5; conjugata diagonalis of 9.5. Following the rule of subtracting 2 centimeters for a pelvis manifesting rachitic characteristics, the vera would be 7.5 — at most, 8 centimeters. On making an internal examination, the promontory was reached with great ease: the linea pectinata were readily outlined. At the time of the examination, the os admitted two fingers; membranes intact. The cervix was serrated by old lacerations; its outline was firm. I estimated the baby weighed between 6 and 7 pounds. The highest pulse-rate since entering the hospital was 100, at midnight of the 23d; her temperature had not been above 99°.

Naturally, two courses were open. One, to place a bag within the uterus, await full dilatation, do version, with an extraction. The second, to perform the section. For the first procedure there was this against it: this woman had a pelvic type which makes a breech extraction most unfavorable for the baby; in fact, if the head had presented forceps, not version would be the operation of election. We faced the possibility — better, probability — of doing a craniotomy on the after-coming head. The woman was in good condition;

the fœtal heart tones were strong and regular. Both being in excellent condition, it was felt that a happy outcome would be the lot of both by the Cæsarean section. At about 11 o'clock the anæsthetic was begun, and at 11 25 the child, weighing 5 pounds 12 ounces was easily delivered, after the uterus had been delivered through the abdominal incision. The fact that she had become pregnant since her operation had led us to believe some ovarian structure had been left; to our surprise, both tubes and ovaries had been left undisturbed. The ventral fixation was made up of a heavy band of perhaps three quarters of an inch wide and three inches long, attached to the anterior uterine wall. A fibroid the size of a hickory-nut was removed. The left tube was considerably thickened and the ovary cystically enlarged; especially on the left side was here enormous engorgement of the veins of the broad ligament.

When the patient was returned to bed, her pulse was 84, and during the next day it was averaging 76, while the highest temperature record was 100°, towards evening. At 3 P. M. of the 25th she vomited, with recurrence six times. At 7 A. M., the 26th, she had a spontaneous brown liquid bowel movement; later, by enema, a considerable amount of flatus was passed. At 10:45 A. M. a severe chill occurred, lasting fifteen minutes. After this chill the temperature was 101° per rectum; the pulse was 90. Her temprature deeclined to normal the next morning, on one occasion rising to 101.4°, until just before death it rose to 102.6°. From the time of the chill the pulse gradually increased in frequency until death occurred on the morning of the 29th, five days after the operation.

PATHOLOGICAL REPORT BY DR. DAVIS, FOUR HOURS AFTER DEATH

*Recent laparotomy wound. Recent Cæsarean section. Œdema and congestion of both lungs. Fatty change in liver. Fibrous pleuritis. Fibrous pleuropericarditis. Healed tuberculosis of left pleura. Acute nephritis. Follicular enteritis. Colon bacillus injection.*

The body is that of a well-nourished woman. Pupils are equal; the superficial glands are not palpable. In the middle line of the abdomen there is an incision 12 cm. in length. The pectorals are of a bright red color.

The peritoneal cavity contains bloody fluid. Parietal peritoneum anteriorly next to the wound is dark, highly congested, but smooth throughout. A portion of the small intestine is dark and injected. Small vessels of the stomach, intestine, and other large vessels contain a large amount of gas. The appendix lies above the brim of the true pelvis, directed backward and upward. It is normal in appearance. Each pleural cavity contains a small amount of slightly bloody fluid. On the right side are many fibrous adhesions; there are none on the left. Adhesions are present between the pericardium and the lung. In the pericardial cavity is a small amount of serous fluid. There are no adhesions present. The thyroid is slightly enlarged. The larynx and trachea show no change. The right lung weighs 375 grams. The surface is smooth. The upper part of the lower lobe is firm. The lung crepitates throughout, but rather feebly in the lower lobe. The cut surface is bloody and œdematous. The upper lobe is normal in appearance. The surface of the left lung is smooth. The organ weighs 350 grams. The crepitation is present throughout, less feeble in the lower lobe. The cut section resembles the right in appearance. The heart weighs 240 grams. The pericardium is smooth ; the myocardium shows no changes. There are no valvular lesions. The aorta and endocardium are stained with hæmoglobin. The spleen weighs 140 grams. The capsule is slightly wrinkled. The stomach contains a rather thick layer of mucus. The duodenum is markedly congested, but the remainder of the large and small intestines does not show this change. The solitary nodules just above the cæcal valve appear swollen. The pylorus is freely opened. The liver weighs 1,600 grams. The surface is of yellowish mottled appearance. The organ is quite soft and cuts readily. The vessels are filled with gas. On section, there are light yellowish areas surrounded by brownish areas. The lobules are very well marked; the centers, dark red, surrounded by lighter areas, and the peripheries red. Gaseous fluid exudes from the liver on pressure. The gall-bladder is moderately distended with black, tarry bile. The ducts are open, and no gall-stones are found. The adrenals show no changes. The right kidney is soft, and the capsule strips readily. The markings are very distinct ; the cortex is pale, and the glomeruli stand out as fine red points. The organ weighs 155 grams. The relation of the cortex to the medulla is as one to three. Near the pelvis of the right kidney is a small fibroma which is circular and measures 2 mm. in diameter. The left kidney weighs 150 grams, and answers the same description as that of the right. The uterus is firmly fixed by a fibrous band to the anterior abdominal wall as a result of a previous operation. The uterus shows a recent incision; numerous catgut sutures are present. The mucosa of the uterus is shreddy and a small blood-clot is found

in the lower part. The cervix admits one finger. There is no evidence of infection. The incision through the mucosa is completely healed. The organ measures 17 cm. in length and 11 cm. in diameter. On cut surface the wall is found to be 2.5 cm. thick. The right tube and ovary are normal. The left were recently removed. The vagina is greatly dilated.

*Bacteriology.* By culture methods the colon bacilli were isolated from the blood of the heart, and fluids from the pericardium, peritoneal and right pleural cavities. The bubbling of gas from the vessels and cut surfaces was typical of the presence of the bacillus aerogenes capsulatus of Welch. No anerobic cultures were made, however.

DISCUSSION

DR. CHARLES B. REED: The report of the case by Dr. Watkins is, I think, extremely interesting, particularly in regard to the adhesions, which he describes so accurately. The subject of adhesions, which produce the incentive for various operations and complicate pregnancy and labor, is one about which comparatively little has been known and written. In the first place, many of these adhesions cause no difficulty, and in fact only a minor number of them give difficulty during pregnancy or labor. The subject is one that requires, and I trust will get, a great deal more investigation than it has received in the past.

As an instance of such adhesions, I will refer to the case of Cæsarean section, the second one on the same patient, which I did some time ago, in which Dr. Watkins kindly assisted me, wherein the woman passed through pregnancy and up to the labor period with a large firm and cartilaginous mass two inches wide and a sixteenth of an inch in thickness, which held the uterus firmly to the abdominal wall, and yet she had received absolutely no difficulty in her pregnancy from the adhesions.

Through the kindness of Dr. Schroeder, I was enabled to see a case at the Cook County Hospital a few days ago, wherein a woman with a large laparotomy scar, pregnant about four months, presented the signs of typical adhesion to the abdominal wall, with considerable pain in the right iliac region. Examination showed the cervix anteflexed, closely bent upon the upper portion of the uterus, very hard and cartilaginous, and not at all like a cervix of pregnancy at that period. The tenderness was pronounced; the uterus was hardly movable. Upon opening the abdomen the presence of a pregnancy at the fourth month was evident. Only a single adhesion existed between the uterus and omentum, which could not restrict its mobility. Upon the right side there was found the small intestine, which was closely adherent to the ovary on that side, and both were put upon extreme tension, especially about the uterus. In this case the adhesion was liberated, and the woman, according to last accounts, was doing relatively well. We cannot always say which of these cases will produce difficulty in labor or pregnancy, and which case will not.

There are a number of interesting things in regard to Dr. Holmes's case. If Dr. Holmes had been as explicit in regard to his indications for the operation as he was in regard to the laparotomy, his report would have been more interesting. In the first place, transverse presentation in a woman who has borne three children normally is, to my mind, no indication for Cæsarean section. It would seem that version would be the most desirable operation, or, at least, the operation of election under such circumstances, on a woman with those pelvic measurements. At any rate, it seems to me the operation was not called for in this intsance.

DR. ALBERT GOLDSPOHN: Before the Columbus meeting of the American Medical Association, which will soon be six years ago, I laid down the following principle: that it is not in the power of any operator to determine how much of a fixation he will get, and that we cannot know how long the suspensory ligament for fixation will remain functionating, or when it will become useless or let go altogether. This declaration was made by reasoning *à priori* from strictly anatomical thinking.

If we will give any kind of sober thought to the anatomy of the parts and their physiology and what is required of them, it is as clear as the sun in broad daylight that such things as these must be the result, even if we had never heard of their recurrence.

Dr. Watkins says that dystocias following fixation operations are the result of accidental infections during the operation. We are not able to shut out infection in some cases, or else we should never have it. We never know when we are going to get it. Let the slightest amount of infectious material get into an operation (and some infectious material gets into every operation), and we shall have more or less unexpected tissue changes. This we must all admit. The aggregation of round cells about an infectious focus or a foreign body and the resulting connective tissue are not, oftentimes, enough to make a difference with the patient, clinically, in pulse and temperature, or in the time of her getting up, nor indeed with her subjective health

at first; and yet there may be the development of a band that no man would surmise, and only some such tragic feature, like those related by the essayist, in the patient's life will bring to light. I had my eyes opened a little by an experience, not of this kind, however, but one that set me to thinking, confirming me in my opinions. I had made my *dictum* before that.

I did an abdominal section on a woman for the removal of a tubo-ovarian abscess on one side. She was a young woman. I saved the tube and ovary on the other side. I resorted to the Mann method of shortening the round ligaments intra-abdominally for the retroversion present. The uterus was large, and therefore the shortening of the round ligaments by loop formation did not seem to be mechanically sufficient for the case. I thought a little additional sero-serous vesicofixation with fine silk, such as we use to sew the intestine, could certainly do no harm, and that this would let go or stretch in case she became pregnant. That woman made an afebrile and smooth recovery, but was again infected with gonorrhœa a few years after that, and was again in trouble, and then a vaginal hysterectomy was in order. I did this in this case; and lo and behold, when the uterus was free of everything that should hold it, it would not come down out of the pelvis. Why? I put my hand up there and found there were two big and hard cords like lead-pencils, tendinous structures, going from the fundus to the abdominal wall. The result of what? The little sero-serous suturing (vesicofixation) I had made. At the time, that made no difference with the patient's subjective health. These bands, like the tendo Achillis, had to be tied off, and then cut. There were blood-vessels enough in them, so that one of them bled quite considerably. This was the result of the little fine silk sero-serous suturing, simply done to supplement the Mann method of shortening the round ligaments. It shows what the thread as a foreign body may provoke.

It is not germane to the subject to say here why the union in other instances is not permanent. Any one who has a mind for pathology knows what becomes of the sutures; they either disappear or cut out. We know, too, what becomes of sero-serous adhesions if there is any lasting pull on them. They stretch or break. I have never been able to swallow this fixation surgery. While I am a German in my general make-up in gynecology and surgery, this is one feature of their teaching (because it was done in Germany first) that I have never been able to second. True, it has not been to my advantage to preach this kind of thing before one medical society and another, and thus invite antipathy and ill-feeling by censuring the practice of many otherwise good men who were given to doing these operations all these years. Yet we can see the dire results now, as displayed to-night. They began to appear in Germany some years earlier. I trust that these fixation operations are thoroughly ruled out by intelligent and responsible operators, in women who retain any capacity for conception. What is true of ventrofixation is even more true of vaginal fixation, because vaginal fixation has been shown to be more disastrous in Europe, in relation to subsequent child-bearing, than has ventrofixation or suspension.

DR. HENRY F. LEWIS: I would like to say a word or two in reference to the case of Cæsarean section reported by Dr. Holmes. The pelvic measurements, I understand, were 24 and 25.2, conjugata diagonalis of 9.5, and vera estimated to have been 8. The ventrofixation, in all probability, in his mind, added another indication for the operation. The fact that this woman, as has been pointed out by Dr. Reed, had normally borne three children, which were small, would indicate that this one would not be very large. He says before the operation the baby was estimated to weigh between 6 and 7 pounds.

DR. HOLMES: It weighed five pounds twelve ounces.

DR. LEWIS: We must remember that the best of us are not accurate at all times in our estimation of the conjugata diagonalis when we measure it with gloved hands. With gloved hand we cannot know exactly the point where our finger nail makes its mark at the base of the other index finger. I regret that Dr. Holmes did not mention what the autopsy showed as to the true conjugate. As an autopsy was made, that would have given an opportunity to make an exact measurement of the true conjugate. Whether that was measured or not, he does not tell us.

Dr. Reed spoke of transverse presentation as not being an indication for Cæsarean section. Transverse presentation would have been no contraindication, in my opinion. The question rests upon the accuracy of the measurements, in the presence of an estimated small child. The transverse presentation apparently had changed considerably from the time of the first examination until the operation, because at the operation the axis of the child seemed to me to be in the longitudinal axis of the mother. In any event, a transverse presentation would have very little or nothing to do with the indications for Cæsarean section. At best, this was a case of *elective* indication for Cæsarean section, and I do not think the reporter has clearly established that.

DR. HOLMES (closing the discussion): Some patients have conditions so clearly marked that indications for operation are palpably evident. Border-line cases cannot have indications so positively drawn; here the judgment of the operator must obtain. As to the pelvic measurements which Drs. Reed and Lewis criticise, I think they are just as accurate as if either of them had taken them. The patient wanted her baby. Both she and the baby were still in excellent condition; pains had been active only for a brief time; she was in a well-appointed hospital. To have done an hystereurysis, version, and extraction most certainly would have meant an eventual craniotomy on the aftercoming head. Any one who has had any experience in breech extractions through generally contracted pelves knows the difficulties and dangers. It was a supererogation on Dr. Lewis's part to intimate that any one would consider a pelvis of 7.5, possibly 8, cm. as anything else that a relative indication for Cæsarean section.

This woman had old scars in her cervix. We never know how long it will take a bag to secure dilatation; it may be over in a few minutes, or not in many days. In view of the pelvic contraction, ventral fixation, and cervical condition, I felt it would be preferable to do the section. No one yet has argued that a transverse presentation was an indication or contraindication to Cæarean section; but, from my view-point, a case which necessitates a podalic version in the presence of a second-degree pelvic contraction may, with other contributing circumstances, point the way for a procedure which to many may not be positively demanded.

I think if Dr. Lewis had not let his mental attitude, in viewing this case, cause a marked astigmatism, he never would have made such a false inference as that the fœtus had presented by a pole. Until the child was extracted it was a well-marked transverse presentation.

As to Dr. Lewis's strictures about the post-mortem. I did not know of it until it was all over. The routine post-mortem examination does not include the measurement of the vera, from the pathologist's standpoint. Dr. Davis is a pathologist; he makes no pretensions to being an obstetrician, and consequently never considered the necessity of measuring the pelvis.

DR. FRED J. TAUSSIG read a paper entitled

ECTOPIC DECIDUA FORMATION

(This paper is printed elsewhere in the present issue of SURGERY, GYNECOLOGY AND OBSTETRICS.)

DISCUSSION

DR. EMIL RIES was asked to open the discussion. He said: Mr. President, the subject of ectopic decidua formation has interested me a great deal, because in part of my work I have been led into regions where decidua formation had to be considered in contradistinction to growths originating in the peritoneal epithelium. Wherever this question of decidua formation in adhesions is considered, the probability of peritoneal growths simulating decidual growths has to be considered. I have examined a large number of cases of various kinds of adhesions due to inflammatory processes, due to tumors, and occurring with extrauterine pregnancy, and in a number of them, when I first looked at the sections, I was tempted to call certain formations decidual, which a further consideration of a large number of sections led me to believe ultimately to be peritoneal growths. These peritoneal growths are very liable to occur in young fresh adhesions, and disappear more and more as the inflammatory process advances with age. Around acutely inflamed tubes, around young extrauterine pregnancies, around acutely inflamed appendices, we find these growths to a considerable extent. In a number of cases I have for some time been unable to differentiate between a decidual growth, a peritoneal growth, and an adrenal growth.

Meyer has published a paper recently in Virchow's Archives in which he considered these peritoneal growths and describes a number of them, indorsing a paper which I published some years ago, in which I described as peritoneal growth formations which other authors had pronounced of adrenal orgin, and which others had believed to be decidual. The differentiation is not always easy.

I operated on a case of occlusion of the vagina, with hæmatocolpos and hæmatometra, bilateral hæmatosalpinx. I operated through the abdomen and through the vagina. I removed only small portions of the tubes, and I opened the tubes, but did not remove them. I removed small portions of the tubes, which were occluded. These tubes were imbedded in adhesions. In these adhesions you could find places that were deceptive, and which might lead you to think they were decidual. The patient was a girl, 14 years of age. In that case, of course, decidual growths had to be excluded, although the similarity to decidual growth is considerable. The history, as well at the findings in various other parts, together with adhesions, led me to the conviction that the formations originated in peritoneal epithelium.

The Doctor's paper has been very exhaustive, and I wish to add one reference, in justice to a man whose book was written some twenty years ago, and which is perhaps not read very much to-day.

I refer to Bayer. What he said in his book is true and correct to-day, and he described the first case of decidual formation of the cervix (in *Freund. Gyn. Klinik*, Strassburg, 1885).

Dr. Frank A. Stahl: I was glad to hear the Doctor's interesting paper read. I had hoped that he would deal also with some of the interesting questions associated with the differentiation between the Langhans cell and the decidual cell; and those of the pseudodecidua in extrauterine pregnancy. I differ from Dr. Taussig in his acceptance of his " cell-detritus " theory as explanation of the metamorphoses of pregnancy; also from him in the manner in which he would have the " cell detritus " escape from the tube and enter the system of the mater, locally and generally. The " cell-detritus " theory, a waste-product theory, as explanation of the active, constructive, and defensive metmorphoses of pregnancy, seems to me too haphazard. Especially the muscle-cell detritus. What is the period of their detrition, and how long does the process continue throughout pregnancy? It cannot be in the uterus, for here there is muscular hypertrophy. A muscular " cell-detritus " process great enough to furnish metamorphotic material throughout pregnancy would involve a considerable destruction of uterine muscular tissue; an atrophy process in principle — but there is hypertrophy. I believe these metamorphoses of pregnancy are caused by the nucleoli from the syncitium nuclei, not cell, divisions. They enter the maternal tissues, wander directly into contiguous tissues locally, and, indirectly, through the circulations, into remoter tissues generally, and thus affect local and general histology and physiology. We have had the pleasure of seeing one of Dr. Ries's specimens, a beautiful section of the liver, in which the nucleoli were well pictured lying between the cells of the liver substance. I could not agree with Dr. Taussig's manner of escape of his detritus metamorphoses causing unit from the tubes. The invading units, in all the ova I have examined, radiate in all directions from the circumference of the ovum, but with the point of oval implantation as the center of greatest centrifugal activity. The picture of the extruded invading fœtal unit is not as though it were exuding from an interval in the tubal folds or fimbriæ. It is not out of the tube, like an exudation, as I take the Doctor's figure. The invading unit takes oval exit and maternal entrance through maternal tissue interstices and circulation.

From my studies of this subject, I have thought it possible, though I know it borders on the speculative, that in the syncitium may reside a principle which, if extracted, might be developed into an antitoxine against this rapid nuclear division and destruction of environment characteristic of the syncitioma and carcinoma.

Dr. George Schmauch: I have listened to Dr. Taussig's paper with considerable interest, and I agree with the statement that there is no real decidua formed in the pregnant tube, at least not in the first two months of pregnancy. Besides, we never find a continuous decidual membrane the way it is formed in the uterine mucosa. We all agree that there are cells found in the pregnant tube which look like decidual cells, but it is still an open question whether these large cells are real decidua-cells or not. Several times in this society the statement has been made, and German text-books quoted, that the decidual cell is not characteristic of pregnancy. This is somewhat incorrect. This statement was first made by Carl Ruge, whom we consider, in Germany, one of the greatest authorities on this subject, and whom we regard as the founder of gynecological pathology. It was made after decidua-like cells were found in myomata, and is correct, but it has caused a lot of confusion.

Decidual formation outside of the uterus cannot be explained by the theory of Webster. The formation of such decidua-like cells in the peritoneum which are regularly found in eclampsia is easier understood by a kind of decidual reaction. We must remember that the transformation of connective tissue cells into decidua-like cells is not typical for pregnancy. Large cells of the same kind are seen in cases of interstitial endometritis, and the membranes cast off in dysmenorrhœa membranacea consist of the same cells. The formation of these large cells in small nodes, which we find in the cul-de-sac, is, in my experience, limited to the neighborhood of vessels. They are all perivascular cells, and many times we find the endothelium of these vessels undergoing a distinct syncitial change. While we may consider the decidua-cells as coming from perivascular cells (Waldeyer), the round cells lying in the reticulated tissue of the uterine mucosa are the proper cells from which the real decidua-cells originate. There is no other organ where such a structure is to be found as in the uterine mucosa. It is a kind of lymphadenoid structure, as some call it. Recently, Doria, an Italian author, came out with the statement that the decidual cells are nothing but lymphatic elements. Dr. Ries showed me once a specimen from a uterine mucosa in which real lymphoid follicles could be seen. I was able to demonstrate to him the same phenomenon in one of my specimens. This might explain in some way that real decidua is only formed in the uterine mucosa,

and not in the tube. In the tube we have the ciliated epithelium directly attached to the muscular wall and hardly any other tissue beneath it, at least no continuous mucosa.

In regard to mistaking decidua-cells for cells which are derived from the trophoblast and from Langhans cells, I will say that both have the same appearance, both have prolongations, both might appear as spindle-cells, and while the differentiation is sometimes easy, it is at other times next to impossible. Sometimes we find between the decidua-cells a fine reticulum of connective tissue, as in the uterine mucosa. The only way to differentiate them is to prove the direct connection with the trophoblast by serial sections. Still, this is the most important part of the question. The proper diagnosis of proliferating Langhans cells is the only way we have to differentiate between harmless remnants of abortion and malignant chorioepithelial proliferations.

These difficulties explain the many different statements made with reference to decidua-cells in ovarian pregnancy. I have examined one case, and I must say I do not find any real decidua formation there. Dr. Stahl's theory is not so absurd as it would appear at the first moment. Many authors regard the decidua formation as a kind of protection of the organisms against the trophoblast and invading villi. I do not share in that opinion, and had rather join Bonnet, who attributes to the trophoblast and chorionic epithelium a digestive power. This is the only way we can understand the nourishment of the child. The transfer of iron and of antitoxines to the child, as shown by (Polano, s. a. o.) experiments, is impossible by simple filtration. Consequently, a digestive power must be attributed to the fœtal cells.

About the formation of decidua in malignant chorioepithelioma, I would correct Dr. Taussig's statement. There are three cases reported. It has been explained in a similar way as in extrauterine pregnancy. Again, the problem is still unsolved, how much of the maternal decidua in intrauterine pregnancy remains towards the end of gestation, whether separation of the placenta takes place in the maternal tissue, or, rather, within fœtal tissues.

While the theory of cell detritus is very acceptable, I do not think it explains fully what we term " decidual reaction."

Dr. Frank A. Stahl: In reply to Dr. Schmauch, I would say that it would be of interest to hear his explanation, with the cell-detritus theory which he accepts *in toto*, of the peculiar but variant decidual formation in intrauterine and extrauterine pregnancy. In the intrauterine there is greatest decidual metamorphosis at the site of oval attachments, placenta uterina. On the contrary in the extrauterine pregnancy (yielding to the controversy for the moment), there is no decidua, or little developed at the site of oval attachment, and some decidua only, in patches, and irregular in distribution, scattered about in the areas without the site of oval attachment, the pseudoplacenta.

In the interautine pregnancy, as normal expression, there are great banks, figuratively speaking, of decidual formation surrounding the ovum; dilatation of oval environment occurs without rupture of containing walls.

In the extrauterine pregnancy, on the contrary, there is absence of regularly developed decidual formation surrounding the ovum; but with dilatation of oval environment there is rupture of the containing walls, as normal expression.

Dr. Taussig (closing the discussion): Dr. Ries's remarks concerning the doubts that must arise in our minds as to decidua in adhesions are correct. We cannot, in the presence of adhesions, determine the exact relationship of the parts. When it comes to interpreting the findings elsewhere, in the peritoneum, on the ovary, in the tube, we have a definite anatomical structure which will help us in the interpretation of these cells. Dr. Pick examined a number of specimens with Hirschberg, and I consider no one better qualified to speak authoritatively on such matters than he. In his description of decidua in the appendix he gave an accurate description of the endothelial cells found in the peritoneum. He had, in his case, a distinct endothelial proliferation in the peritoneum, and in comparing this with the cells be found *beneath* the peritoneum, he noticed very striking differences. Moreover, *beneath* the peritoneum we cannot expect to find any endothelial proliferation; consequently that doubt must cease, from the location in which the decidua is found. I understood Dr Schmauch to say that decidua could only be formed from the ciliated epithelium of the tube. That is not the case. It is found beneath the epithelium in the loose connective tissue, as well as beneath the epithelium of the tubes. Similarly, connective tissue cells are found in the uterus. In the case of which I spoke, where the appendix was found imbedded in hemorrhagic masses, I found that the endothelium of the peritoneum had proliferated, and not only were there certain characteristics, such as shape, arrangement, staining quality, nucleus, and size, which would have differentiated it from the true decidua-cell, but also the location in which these cells were found, namely, directly continuous with the endothelium instead of beneath the peritoneal lining. I am free to admit

that it is not always an easy matter to tell a decidua-cell, neither is it so easy to tell a cancer-cell. We have the same trouble in differentiating cancer from sarcoma that we have in differentiating a decidua-cell from a Langhans cell. No one would be willing to say that there is such a thing as the typical appearance of a cancer-cell, nor is there a typical decidua-cell as such, but if we find larger patches of decidual elements grouped in a particular way, having certain staining qualities, and lying in certain anatomical positions, we are as much entitled to make a diagnosis of decidua as we would be under similar circumstances in making a diagnosis of cancer. At the same time, we would not be entitled to make this statement if there were abnormalities in the size of the cell, if it merely looked suspicious, or if we found only one or two elements on which to base our opinion. I want to emphasize the fact that while we may have doubt as regards the true nature of single cells, we can be positive in most of the cases regarding the larger areas of decidua.

I may have gone into the realm of hypothesis, but Dr. Stahl went even further. I did not wish to do anything more than to indicate the manner in which an irritation from the placenta might be spread over these areas, and in that way account for the peculiar anatomical distribution. As to what that substance is, whether it is a chemical that is carried along in the same granular detritus, or whether it is broken-down cells, we do not know. But one thing seems clear, and that is, this substance is not carried by the lymph or blood channels. That point impressed itself upon my mind in the study of these numerous cases. It must come in some other way, and the only way it could come was the way I have already mentioned. If Dr. Stahl's theory is correct concerning the nucleoli of Langhans cells causing this irritation, we should find decidual cells in the liver, or wherever these nucleoli have been found. But we do not find that to be the case.

I purposely avoided mentioning the formation of decidua at the site of implantation of the ovum in the tube, for the reason that it is a question about which so much can be said that it would certainly have taken us far beyond the limits of the evening.

I did not quite understand the remark of Dr. Schmauch concerning the case of syncytioma.

DR. SCHMAUCH: There have been three cases reported in which there was complete decidua in the uterus. I cannot say how long before pregnancy happened. But the authors of these cases explained decidua formation by a kind of decidual reaction.

DR. TAUSSIG: If that point is to have weight in our consideration, we must know how long after the abortion or the pregnancy syncytioma developed, for we know that decidual cells may remain long after the expulsion of the ovum; also, we may have nests of decidua that are not absorbed, so that the decidua may be the remnant of the original pregnancy, and not the result of the irritation of syncytium. This is a possibility that should be considered.

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## WESTERN SURGICAL AND GYNECOLOGICAL ASSOCIATION

The fifteenth annual meeting of this Association was held in Kansas City, Missouri, December 28 and 29, 1905.

The Association met at the Midland Hotel, under the presidency of Dr. H. D. Niles of Salt Lake City, Utah.

DR. W. W. GRANT of Denver, Colorado, read a paper on

CARCINOMA OF THE DESCENDING COLON

This paper appears in the present number of SURGERY, GYNECOLOGY AND OBSTETRICS.

### DISCUSSION

DR. I. B. PERKINS of Denver, Colorado, reported the case of a woman, 62 years of age, whom he saw a few weeks ago, and in whom there was a tumor in the groin, in the region of the cæcum. It was supposed by the physician who had charge of the case to be an appendiceal abscess. The tumor was very hard. There was vomiting of fæcal matter, and had been for twenty-four hours. He made a long incision in the right rectus, and on examination found a hard tumor, but no pus. The appendix was caught in the mass, as also the ileocæcal valve and a portion of the cæcum. He resected the intestine and closed the end of the colon by the use of the Connell suture, then implanted the ileum into the upper portion of the wound. The patient did well, except that there was a slight leakage at the outer and upper portions of the anastomosis. The patient had a very small fæcal fistula, which he thought would soon

close. Should another similar case come under his care, he believed he would close the ends of both guts and make a lateral anastomosis.

Dr. A. W. Abbott of Minneapolis, Minnesota, spoke with reference to cancer, saying that he had seen two cases of intussusception in his own practice, and one in the practice of the late Dr. Dunn. He thought intussusception occurred in cancer of the large intestine oftener than in the small. He had never seen a case in the small intestine, but had no doubt it might occur. He thought it was wrong to make an immediate anastomosis in these cases, because they were the ones in which he thought a colostomy should first be made, inasmuch as the condition about the cancerous area was so extreme that the parts would not unite if one attempted to sew them.

Dr. J. E. Summers of Omaha, Nebraska, spoke with particular reference to the location of carcinoma, and said that he had found it everywhere in the large intestine, except at the hepatic flexure. In dealing with carcinoma of the transverse colon, it was essential to manipulate the gastrocolic omentum, and unless this was done with the greatest gentleness, the surgeon was apt to have a complication following the operation, which might be serious; namely, hemorrhage from the stomach. A week or more ago he removed the transverse colon for carcinoma, and as a result of manipulation there was a serious hemorrhage for days from the stomach. His attention was first drawn to this complication some years ago, following an operation for incarcerated umbilical hernia, in which it became necessary to remove considerable portions of the omentum, and in so doing the manipulations were rather rough. The operation, however, was proceeded with without any special difficulty, but was followed in two hours by a profuse hemorrhage from the stomach, from which the patient died.

Dr. Grant, in closing the discussion, said he wanted to point out that the symptoms of this disease were not pronounced at an early period; but when there were suspicious indications it was very important to use more care in examining those patients than the surgeon was accustomed to use. Under favorable conditions, when the bowels were thoroughly evacuated, the surgeon might discover the presence of a growth in the colon, and this was the time when operation brought about such satisfactory results, and it was also the period when operation could be done at one sitting.

## The Transvesical Operation for the Relief of Prostatism in Aged Males

Dr. Charles E. Bowers of Wichita, Kansas, in a paper on this subject, stated that more conservative and rational operations on these patients would yield better results and lower the mortality per cent materially. An exact diagnosis in many cases could only be made by suprapubic exposure of the vesical outlet. The suprapubic operation could be done, in his judgment, with greater exactness, and would yield better results than the infrapubic in morbid conditions in the male, as had been the case in the female pelvis. The suprapubic route was as rationally indicated for the relief of prostatic obstruction at the urinary outlet as it was in vesical calculus. The perineal operation offered only thirty per cent of cures, with a mortality of seven per cent and a fifty-per-cent chance of having exchanged one urinary difficulty for another, and not infrequently a lesser for a greater one. The transvesical operation entirely relieved all who survived it of their urinary trouble, if it was due to obstruction in and about the vesical outlet, except when they were carcinomatous in character, without sequelæ, and, with the improved operative technique of to-day, with no greater mortality.

The controversy that was now going on with reference to perineal and suprapubic prostatectomy was only a repetition of the one waged when lithotomy was undergoing its evolution. Who to-day cuts for stone in the male bladder *via* the perineum? The most essential thing was to bring home the facts to the profession in general: 1. That prostatism was due to other causes than hypertrophy of the prostate gland. 2. That the transvesical operation for the relief of prostatism had attained a sufficient degree of perfection to be recommended to this class of pitiable sufferers, with the assurance of a cure if the operation was undertaken before the inflammatory process had reached the kidney and arrested its functional activity. 3. Patients should not be submitted to catheterism in the future as they had been in the past, until it was hopeless to interfere surgically.

### Discussion

Dr. Henry T. Byford of Chicago expressed the opinion that hypertrophy of the prostate was due to some irritation, and not to age alone, or to the sclerotic changes which occur with age. In some cases of enlarged prostate he thought there was a gouty diathesis, and that perhaps the treatment recommended by Fletcher, of reducing the calories from 3,000 to 1,500, and dieting the patient a little, might obviate the necessity of suprapubic cystotomy in some instances.

Dr. James E. Moore of Minneapolis, Minnesota, said that he performed his first prostatectomy suprapubically twenty years ago, and as it was

done at that time it was a bloody, blind, and unsatisfactory operation. When perineal prostatectomy was suggested and practised so successfully a few years ago, he took it up and had been an advocate of it ever since. He maintained that there were certain cases that could be operated better by the suprapubic route as it was done at the present time. However, in his judgment, a surgeon was not broad-gauged; he did not do the best work he could do until he performed operations both perineally and suprapubically. He believed the perineal route was the choice in the vast majority of cases.

Dr. W. W. Grant of Denver, Colorado, believed that in the average case the perineal operation was the more desirable. In cases in which there was pus, hyaline, and granular casts, the perineal route was indicated. The dirty cases could be better and more safely operated through the perineum; while the clean cases could be treated by modern suprapubic cystotomy.

Dr. J. W. Andrews of Mankato, Minnesota, maintained that there were selected cases which should be operated by the transvesical route, but in the majority of instances he thought the perineal route was the better. He had operated eleven times, with one death. One of the operations was done suprapubically. He found it difficult, unclean, and was unable to get good drainage, and said that lack of drainage was one objection to the suprapubic route, as it was not and could not be as good as it was through the perineum.

Dr. M. L. Harris of Chicago said that when a surgeon attempted to generalize from a few cases, the generalizations were usually wrong. The essayist, he said, had generalized from twelve cases that the suprapubic route was the only one to adopt; consequently he thought he was wrong. There were many cases in which a good and thorough operation could not be done suprapubically. There were also many cases in which the best operation could only be done suprapubically; consequently the surgeon must select the best operation for the particular case. Every case of prostatism should be diagnosed accurately before an attempt was made to select the method of operation, and the surgeon could only make such a diagnosis when he employed all the means at his command, and one of them was a thorough cystoscopic examination.

### Some Observations on Renal Surgery

Dr. D. W. Basham of Wichita, Kansas, dealt with certain questions with reference to nephroptosis and suppurative diseases of the kidney, and pointed out the reasons why nephrorrhaphy sometimes fail to relieve the symptoms. He discussed the desiderata necessary to make the operation a curative one. He criticised the methods in vogue, and referred to the modifications necessary to make the operation curative by fixing the kidney in a natural position and of obliterating the enormous pouch resulting from the mobility of the kidney.

Reference was made to the methods of Jacobson and Edebohls. He said that these operations gave permanent results so far as anchoring the kidney was concerned, but he thought the kidney was fixed too low in the loin, too far from the center of the vertebral column, and too near the anterior wall of the abdomen. There were many operations which anchored the kidney permanently, but were open to objection from the standpoint that the organ was not held in the natural position. He thought surgeons performed too many nephropexies without making a thorough and painstaking effort to ascertain the condition of the kidney, its pelvis, and the upper part of the ureter.

#### Discussion

Dr. William Jepson of Sioux City, Iowa, believed there existed a range of mobility of nearly an inch to every kidney that was normally placed. Each case of movable kidney had to be considered by itself. A certain number of them had to be fixed. He expressed himself as not being a firm believer in decapsulation of the kidney, for the reason that it had been demonstrated experimentally that after a kidney was decapsulated, in the course of three or four months a new capsule was formed, and the amount of blood-supply the kidney received from the new source during the time it existed was not sufficient, in all probability, to maintain vitality of that part.

Dr. A. W. Abbott of Minneapolis, Minnesota, said that in a series of over two thousand postmortem examinations, only a very small number of kidneys were found beyond the limits described in text-books, but this was not in accord with clinical experience. There were very few of these patients who presented any symptoms referable to the position of their kidneys, largely due to the fact, he believed, that the upper part of the ureter fell with the falling of the kidney.

Dr. C. W. Oviatt of Oskosh, Wisconsin, stated that occasionally it was necessary to operate on cases of movable kidney, and if an operation was undertaken, he thought surgeons should profit by the teaching of Harris, which was promulgated several years ago, of obliterating the space beneath the kidney by the Harris method, making a new pocket of peritoneum, using a purse-string, as Harris did, rather than trying to suspend the organ

alone either by the fibrous or fatty capsule. If suspension of the kidney alone was resorted to, undoubtedly there would be a recurrence of the displacement.

Dr. A. E. Benjamin of Minneapolis, Minnesota, laid down three or four rules for fixing a movable kidney. One was when it showed evidence of hydronephrosis due to a faulty position of the kidney, or to kinking of the ureter, not allowing free drainage. Another was where there was enlarged kidney, congested or dilated,and where it was tender. On examining such patients, he said one could elicit pain by palpating the kidney. Another condition was where the kidney seemed to produce obstruction of the alimentary canal, either of the colon or duodenum, and accessory organs, such as the gall-bladder apparatus, the common bile-duct, etc. In such cases the kidney was prolapsed, adherent down in the pelvis, and the patients were troubled with obstipation, and by putting the kidney in position and relieving the adhesions, the symptoms would partially or entirely disappear. Patients with a dilated condition of the stomach and a diseased condition of the gall-bladder, when apparently due to loose kidney, were sometimes benefited if their cases were taken in hand early.

### The Choice of Ligature and Suture Material in the Surgery of the Peritoneum

Dr. H. G. Wetherill of Denver Colorado, read a paper on this subject, in which he stated that he no longer used non-absorbable ligature or suture material for purely serous surfaces. The absolute sterilization of catgut was no longer difficult, and it was now realized that so-called catgut infections usually had their origin in a contamination of the gut, through handling or in allowing it to come in contact with unclean surfaces or substances in or about the wound.

The chromizing process prolonged the life of even the smaller strands to any desired time, providing the mucous surfaces or secretions were not in contact with it. These features made of catgut an ideal suture and ligature material for intraperitoneal use, and all that became necessary was the exercise of due care and skill in the selection of the catgut and the application of sutures and ligatures and the making of knots. So far, he had had the good fortune never to have had a secondary hemorrhage or other accident from the use of catgut, either in the way of a slipping knot or a too rapid absorption, and he believed that this immunity from accident was due to the exercise of great care in its application.

For about three years he had had great satisfaction in using the Downes electrothermic cautery clamp in selected cases, thus doing away with all ligature and suture materials around pedicles. For vaginal hysterectomy, particularly in cancer of the uterus, it was ideal, in that it promoted rapidity and safety in the work, and gave much greater security against the danger of recurrences in early cases. There was, in his experience and judgment, no doubt that patients operated upon with the Downes clamp by either the vaginal or abdominal route had smoother and more rapid recoveries, and, above all, there was a very noticeable freedom from the intense pain and backache so common after all pelvic operations when the terminal nerves of this region were left for days or weeks in the bight of a securely tied ligature or closely applied suture. He had had one or two experiences with the Downes clamp, however, which led him to believe that there was increased danger from thrombosis and embolism after its use, occurring occasionally several weeks after operation, and until this doubt was settled he would exercise great care in the selection of the cases upon which it was to be used.

#### Discussion

Dr. J. F. Binnie of Kansas City, Missouri, stated that Dr. von Brun had brought out a material which was better than the Pagenstecher suture. It was white linen thread impregnated with celluloidin. It was absolutely smooth The surface of it was as smooth, almost, as silkworm gut. He thought it could be improved by putting a little more celluloidin into the thread. Some of his professional friends had been using the von Brun celluloidin thread for every purpose in which silk, Pagenstecher linen thread, or silkworm gut could be used, and it had proven to be very convenient suture material.

Dr. J. F. Percy of Galesburg, Illinois, related an experience he had had with catgut coming out in intestinal work. He had a case which showed evidences of intestinal obstruction seven days after doing a simple appendectomy, and on opening the abdomen the next morning he found that the stump of his appendix had given way, unfortunately. He related this experience to Dr. W. J. Mayo, and since that time he (Mayo) had not used catgut in the intestine, or at least in doing appendectomies. It was the understanding of the speaker that the Pagenstecher suture was an absorbable one. He had removed within a few days No. 3 Pagenstecher linen suture which he had used in the so-called Martin method of doing colostomy; that is, lifting up the mesentery and putting the Pagenstecher thread on each side of the wound. In removing it five days afterwards, he found that

half of the diameter had been destroyed, and in that region, at least, the Pagenstecher suture was absorbable. In the intestine it would not absorb so quickly; but he thought there was no question about its being absorbed.

Dr. Willard Bartlett of St. Louis, Missouri, called attention to some experimental work which was done a few years ago by Clumpsky in the clinic of Professor Mikulicz of Breslau, with reference to the length of time that through-and-through gut sutures held, or to the length of time they were used during which they did any good whatsoever. Clumpsky sutured a large number of dogs' intestines and then exerted hydrostatic pressure on the interior of these intestines at various times after the insertion of the suture. He found that in end-to-end suture the sutures were resistant to intraintestinal pressure for the first forty-eight hours; that is, they would maintain the same intraintestinal tension without bursting at the suture line for forty-eight hours, the same as when they were originally applied. After the first forty-eight hours the establishment of granulation tissue around the sutures rendered the gut somewhat cheesy in consistence, so that the sutures began to cut. At some time after their insertion, and from the end of the second day up to the end of the fifth day, there was progressively lowered resistance to the column of water; that is to say, when the suture was first applied, it held a pressure of ten pounds, theoretically; at the end of twenty-four and forty-eight hours, it still held ten pounds; while at the end of the third day it held eight pounds, and at the end of the fourth day, some six pounds, and so on. He was of the opinion that catgut could be so treated that it would last five days.

Dr. Arthur E. Hertzler of Kansas City, Missouri, believed that the Connell suture, while it was best in the hands of the experienced, was much less certain than the Lembert suture. If used as a protection for the Lembert suture, it was much better than the Czerny suture. As to the length of time it required for the intestine to heal in order to make firm protection, he had found it to be very variable. So far as the nature of suture material went, it depended largely or entirely on the one condition of whether infection could be prevented or not. If infection could be prevented, then plain catgut was sufficient. If infection could not be prevented, then it depended entirely upon walling off the adhesions of the intestines about it. The safeguard in intestinal anastomosis was the protective adhesions about it. If infection did not prevent these adhesions, then the surgeon was successful in his anastomotic work. If infection prevented adhesions, the infection extended. He did not believe there was such a thing as intestinal anastomosis without adhesions, with or without infection.

Dr. Herman E. Pierce of Kansas City, Missouri, reported the death of a girl of ten upon whom he operated for a circumscribed abscess surrounding a necrotic appendix. The appendix was removed, the cavity thoroughly cleaned out, and he saw no reason why the patient should not recover. An attempt was made to close the stump with catgut, leaving the silk or Pagenstecher thread out of the abdomen. Patient had a normal temperature for three days after operation, then was suddenly seized with pain, which was followed by rapid peritonitis and death. Post-mortem showed complete absorption of a portion of the No. o catgut that was used to ligate the stump of the appendix, and absorption to the point of giving way in the catgut that had been used as a purse-string suture. The catgut was what is known as pyoktanin catgut. He was satisfied that at some point he perforated the mucous surface of the intestine, and rapid leaking caused the death of the patient.

Dr. F. Gregory Connell stated, as to the suture or stitch penetrating the lumen of the bowel, experimental work had proven that the suture loosened itself and passed into the lumen of the intestine and came away.

As to catgut and the Pagenstecher thread, which had so many advantages that it had replaced plain silk, if Pagenstecher thread was used in any organ of the body, and was eliminated, then he thought the chief advantage of catgut was done away with, as it was absorbed. The power of its being absorbed was the chief advantage of the catgut.

### A New Technique for Breast Amputation

Dr. Jabez N. Jackson of Kansas City, Missouri, contributed a paper in which he described a new technique for use in radical operation for carcinoma of the breast. The method of operation, he said, was devised by him about eight months ago, and had since been used exclusively by him in all cases of this character with which he had had to deal. His experience with the method was limited to eight cases, and he believed that it had certain elements of advantage, as well as originality, which justified him in presenting it for a wider field of service. After fully describing the technique at length, he pointed out and emphasized the following advantages:

1. The flap forms a covering for the chest defect, as a rule, without any tension, and almost entirely obviates the necessity of grafting, which is so frequent in other methods. He had not found

any case operated on by his method that required grafting. This was not intended to cover cases where there had been extensive previous ulceration, or where one could not get healthy tissue for a flap of any character.

2. The drawing of the skin up to the arm did away with the fossa axillarius, and thus with the large space which nature would have to obliterate by the formation of scar tissue, with the resultant pressure upon the axillary vessels and nerves.

3. The ligation of all vessels at their nearest point of origin did away with the use of a large number of hæmostatic forceps, which cause loss of time, to say nothing of the inconvenience of having a large number of instruments in one's way. He had in no instance used more than one dozen forceps in this operation, and said he could usually do the work with about six. The operation was thus shortened. As a rule, he found that to complete the operation required from forty minutes to one hour or thereabouts. Personally, he had never run beyond an hour, even doing the operation slowly, as he had in most cases for the purpose of demonstrating this new technique, and he had done the operation in a period of time as short as forty minutes.

4. The most noticeable feature to the onlooker, when the operation was done, was the marked absence of hemorrhage, so that it could almost be called a bloodless operation.

5. The entire technical portion of the operation was completed before the chest was exposed by the removal of the breast; therefore long exposure of an enormous area of raw chest surface, with the attendant shock, was done away with. As soon as the breast was removed, the surgeon was ready to close the wound.

DISCUSSION

Dr. Charles A. Powers of Denver, Colorado, said it seemed to him that the key to the operation described by the essayist lay in the flap which covered the large skin defect. This feature appealed to him very much. He asked whether, in any of the cases, there had been any sloughing at the corners of the quadrilateral flap. Personally, he had been very much pleased with the procedure advocated and practised by Dr. J. Collins Warren of Boston, of bringing up a flap from the arm in breast amputations. The technique of Dr. Jackson's operation, however, he thought, was easier, and he said he would employ it in his next case of cancer of the breast.

Dr. Jackson, in reply, stated that in some cases there had been slight sloughing at the corners of the flap. In recent cases, however, by using a wide Halsted mattress suture for tension, union was secured without sloughing.

Fractures about the Elbow-joint

Dr. W. D. Haines of Cincinnati, Ohio, said that the open method of treatment was to be commended in all cases of extensive joint involvement. After freely exploring the joint cavity, freeing it from clot, removing detached spicula, and fixing the fractured fragments, a strip of fascia from the arm might be inserted between the joint surfaces, after the method of Murphy in excision, or the Mosetig Moorhof bone plug might be used, with a view to preventing adhesions until sufficient repair had taken place to permit of passive motion. The operation was completed by suturing the capsule, fascia, nerves, and skin with ample provision for drainage. The arm should be dressed in the fully extended position, placed on an incline, and a light weight applied. This position and dressing should be changed at the end of one week. After light massage, the arm was redressed at a slight angle and permitted to remain so for four or five days, when it was changed to as nearly a right angle as possible without paining the patient too severely. Subsequent treatment consisted of massage and passive motion every third day for a period of three weeks. Local pain and tenderness were given precedence over crepitus by the author in diagnosis. The use of weights to overcome muscular rigidity permitted of infiltration, diminished elasticity, interfering with rather than assisting in the reduction of there fractures. The proper treatment of pain and swelling accompanying fracture was early reduction, and the application of extension, ice, or other adjuvants being deemed advisable. Immediate amputation was reserved for those extensive crushing injuries, such as bumper wounds, in which the circulation and joint were so badly damaged as to be beyond all hope of repair. The author expressed the opinion that fractures about the elbow-joint had been overtreated in the past.

DISCUSSION

Dr. John P. Lord of Omaha, Nebraska, confined his remarks to the overtreatment of fractures which these cases received in the matter of passive motion. General surgeons had learned something from orthopœdists in regard to passive motion in the presence of trauma. In these cases the origin of the arthritis was a trauma, and excessive passive motion too frequently used perpetuated the arthritis. In the majority of these cases, passive motion should not be repeated oftener than once a week, and sometimes not as often.

The manipulations should be gentle, and the swelling and infiltration should be treated by hot applications, galvanism, which were of benefit; but the heroic treatment which these patients received at the hands of those who were overambitious to restore function perpetuated rather than relieved the condition.

Dr. J. E. Summers, Jr., of Omaha, Nebraska, stated that, if he understood rightly, in operative procedures on these fractures the essayist spoke of the danger of gangrene and suppuration. In a practice of twenty-five years he had never seen gangrene or suppuration following trauma of the elbow-joint which was not compound; but he had seen suppuration and infection in the elbow and other joints where interference was adopted along the line suggested by the essayist. Of course, with modern technique this was not to be expected. Only in the hands of experienced, skillful men was a cutting operation justifiable in this class of cases. Only in exceptional cases should the open operation be resorted to. He had adopted the open incision in old cases, but never in recent ones, and he had had a reasonably large experience in the treatment of traumatisms of joints.

Dr. A. E. Benjamin of Minneapolis, Minnesota, stated that last year he read a paper on this subject, and the conclusion he reached then was that the proper thing to do was to treat these cases of fracture of the elbow-joint by the open method. Surgical interference should be instituted as early as possible, providing one was not sure that everything was in place. The surgeon should consider the soft structures which he could not see with the X-ray, and he could not demonstrate by manipulation. It was just as reasonable, in his opinion, to suppose that one could cure a retrodisplacement of the uterus, or diseased tubes and ovaries, by a pessary and by applications as it was to treat cases of fractures of the elbow and cure them without the open method of treatment. While this was a broad statement to make, he was quite sure the time would come when they would be of the same opinion.

Dr. Charles H. Mayo of Rochester, Minnesota, desired to put himself on record as being in favor of the operative treatment of fractures in the region of the elbow-joint. He believed in it. He did it more frequently now than formerly. He divided these cases into two classes — the adult and the child. If he could see a case of fracture of the elbow-joint before the consequences of the fracture took place — swelling, hemorrhage from the narrow effusion, etc. — if he could feel loose fragments and could operate inside of the first day after the injury, in the case of an adult he would not hesitate to remove the loose particles in the joint, but would not do so in the case of a child, because it might interfere somewhat with growth.

Dr. E. O. Jones of Murray, Utah, said that in his experience with fractures of the condyles of the humerus, as far as the functional and final result went, it made no difference whether passive motion was instituted early or late, or at all, if the fractured fragments had been accurately replaced and kept in that position. But in those cases where the fragments had slipped away, in his experience passive motion, either early or late, would not effect a good result. The reduction of a recent or fresh fracture of the condyle had been very easy with him, but holding it in position had been a very difficult matter by the ordinary means of dressing. A method which he did not hear the essayist mention, and which in his experience had given most excellent results, was one which had been devised by Dr. John B. Roberts of Philadelphia. It consisted of the subcutaneous nailing of the fractured condyle to the shaft of the humerus with a fine steel nail, provided with a long square head, which would facilitate the removal of the nail afterwards. He had used this method in some twenty-odd cases and the results had been uniformly good. With this nailing he had found that it made no difference in which position the arm was dressed, whether any splint was used at all, or whether passive motion was instituted afterwards or not. In his opinion, in these cases the important point was to secure permanent and accurate replacement of the fractured condyle.

Dr. Miles F. Porter of Fort Wayne, Indiana, said that, in his experience, which covered quite a number of these cases of fracture, he had never had any occasion to open a joint, nor had he seen a useless joint as the result of the closed treatment.

One point that impressed him during the reading of the paper was, that if there is any fear, even in the best of hands, of infection, why should drainage be resorted to? If there was no danger of infection, he maintained that the patient was better off without drainage. If there was danger of infection, in proportion as that danger was great the surgeon ought to avoid the possibility of infection by keeping the joint closed until there was an absolute necessity for opening it. He expressed himself as being opposed to treating the average fracture about the elbow-joint by the open method, because he thought by the closed method the results were quite as good, if not better.

Dr. S. C. Baldwin of Salt Lake City, Utah, said that while he did not favor the open method of treating the vast majority of these cases of fractures, yet it was necessary sometimes to open up

the elbow-joint for the treatment of such a fracture. He recalled a recent case, in a child about eighteen months old, in which the external condyle was split off, and drawn down to such an extent that the fragments were separated fully an inch and a half. The result was that if the fragments had not been replaced, pronation could not have taken place, and it was impossible to do this in any way except by the open method, which he resorted to.

DR. HAINES, in closing the discussion, said that he did not wish to be understood as advocating the open method in all cases. As to light passive motion and massage, they should be instituted early.

### TALIPES CALCANEUS

DR. A. F. JONAS of Omaha, Nebraska, described a plastic operation for the permanent relief of cicatricial talipes calcaneous.

### TUBERCULAR PERITONITIS

DR. T. E. POTTER of St. Joseph, Missouri, referred to the etiology of tubercular peritonitis, to the symptoms and diagnosis, giving the more modern views on the subject. He said an early diagnosis was very desirable, and the physician was urged to be on the alert when there were any symptoms pointing toward tubercular peritonitis. Success in treatment at any age was much greater when the disease was recognized before it had made too extensive progress.

With reference to treatment, the writer gave preference to surgical methods, showing that at least 66⅔ per cent or more recovered in the hands of surgeons, while not more than 33⅓ per cent recovered after medical treatment, by the latest and most approved methods of hygiene and the administration of medicines.

A discussion of the theories as to the benefit of surgical interference was taken up in the paper.

#### DISCUSSION

DR. A. W. ABBOTT of Minneapolis cited some experiments which he had made in twelve cases of tubercular peritonitis. All of them were accompanied by more or less ascites. After opening the abdomen and allowing the fluid to drain out, the peritoneum was closed as well as possible, and then between some of the stitches a canula was introduced and the abdomen filled with pure oxygen. The abdomen was then closed entirely and left in that condition. These twelve patients made perfect recoveries, without any recurrence, and it seemed to him that the recovery was more rapid than in those cases where this treatment was not undertaken.

### THE TREATMENT OF VARICOSE VEINS

This paper, by DR. CHARLES H. MAYO, will appear in a later number of SURGERY, GYNECOLOGY AND OBSTETRICS.

### CHYLOUS CYSTS OF THE MESENTERY

DR. MILES F. PORTER of Fort Wayne, Indiana, presented a study of the literature, together with the report of twenty cases, including one of his own, which he reported, and which formed the basis of the paper. He said the literature was very meager. The history of chylous cysts was mixed with that of mesenteric cysts in general. Cysts of the mesentery were first classified by Portal in 1803. Killian reported the first chylous cyst treated surgically, but Bramann's was the first one operated. Carson was probably the first in America to report a case of chylous cyst treated surgically. Chylous cysts were rarer than serous cysts. The origin of chylous cysts must be regarded as manifold. They may be single or multiple, unilocular or multilocular, and multiple cysts might become multilocular single cysts and later unilocular by pressure absorption. There was nothing distinctive in chylous cysts save their contents and location. An exact diagnosis was neither possible nor necessary. A centrally located movable tumor crossed by bowel would be almost diagnostic of mesenteric cyst. Puncture for diagnostic purposes was condemned. Belly pain was a common symptom, and recurrent attacks of pain accompanied by vomiting and other symptoms of bowel obstruction were very significant. Chronic increasing constipation was a common symptom. A history of trauma was common.

Treatment was surgical, and the technique depended on the findings in each case. The fear of permanent chylous fistula in cases treated by drainage was unfounded.

The whole number of cases reported was 20; number operated upon, 14; total deaths in operated cases, 3; number of cases treated by excision or enucleation of cyst, 8, of which 6 recovered and 2 died. Number of cases treated by incision, stitching the sac to the abdomen, and draining, 5, all of which recovered. One case, treated by excision of the cyst, mesentery, and bowel, died. Only six cases were found reported post-moretm, which would seem to prove that, when present, chylous cysts of the mesentery usually manifested themselves as symptoms sufficiently pronounced to lead the host to consult a physician.

The author drew the following conclusions:

"1. Chylous cysts of the mesentery are to be classed with the surgical rarities, being less common even than serous mesenteric cysts.

"2. Many chylous cysts of the mesentery begin as multiple cysts, later become multilocular, and finally unilocular by the process of pressure absorption.

"3. The origin of chylous cysts is manifold, and the microscopic pathology varies equally.

"4. Trauma seems to be a causative factor in quite a number of chylous cysts.

"5. Diagnosis of cyst of the mesentery may be impossible, but, in the majority of cases, can be made before opening the abdomen, but the character of the cyst contents cannot be determined by any safe procedure until the belly is opened.

"6. The treatment of chylous cysts of the mesentery consists in their removal by that technique which seems best adapted to the case in hand, after it has been studied through the open abdomen."

### Undescended Testicle

Dr. A. E. Benjamin of Minneapolis Minnesota, referred to the causes of undescended testicle, and said it may be due to improper development of the organ, to a rudimentary vaginal process, to peritoneal adhesions between the testicle and bladder or intestine, and to obstruction of the canal. The testicle might be found anywhere along its course of descent to a point just outside the external ring. Hernia was a common complication of this condition. The organ would not develop as well when located at any point above the scrotum. The possible sterility of the cryptorchid, and the frequency of malignant, tubercular, and traumatic disturbances complicating this condition, all argued for an early operation to place the gland in its proper location. The operation for undescended testicle had been perfected in the last two years. It has been demonstrated that by careful dissection and an occasional sacrifice of the spermatic vessels, the organ will remain in the scrotum.

### Treatment of Acute Diffuse Septic Peritonitis

Dr. Donald Macrae, Jr., of Council Bluffs, Iowa, read a paper with this title, which was limited to the consideration of the treatment of acute general or diffuse septic peritonitis. Under this head he also included sudden septic extravasations into the peritoneal cavity, which were diagnosed and attacked before the peritoneum was macroscopically or symptomatically involved, but which, from the amount and character of the septic material liberated, probably insured a violent general infection of the serous membrane within a few hours. General infection of the peritoneum should be considered as a disease, the intensity of which depended upon the virulency and not wholly upon the amount of the septic material liberated.

Up to the year 1900, after attempting every method advocated for the treatment of peritonitis, he became discouraged, and had about concluded to let nature take her course, instead of resorting to the knife, when he came upon the paper of Dr. Fowler of New York, who strongly advocated the sitting-up position, and reported nine consecutive recoveries. The author tried this method, with drainage over the seat of the primary pathology, with flushing of the cavity with normal salt solution, and was gratified with the results; not that his recoveries were so eminently successful as the reported cases of Fowler, and later of J. B. Murphy, but that some of his cases recovered.

After citing a favorable case in which he resorted to the Van Buren Knott method of drainage in a case of strangulated inguinal hernia in a boy aged 18, the author drew the following conclusions:

1. The so-called Fowler position should be established in all suspected cases of peritoneal infection, local or general.

2. The primary cause of the infection should be removed, if possible.

3. The cavity should be thoroughly wiped out with hot normal salt gauze.

4. A large soft rubber tube, one inch in diameter, should be inserted immediately above the symphysis pubis to the bottom of the pelvic cavity (Knott).

5. The tube should be sucked dry as often as necessary.

6. A half-inch tube should be inserted over the seat of the primary pathology, through a stab-wound in the belly.

7. No gauze should be used, except in case of hemorrhage, or to render a part extraperitoneal, and then should be covered with rubber tissue.

8. Flushing of the cavity with fluid is unnecessary, and may cause harm.

The author's reasons for advocating these conclusions were based on his results in operated cases of general acute peritonitis on the human animal.

Dr. William Jepson of Sioux City, Iowa, read a paper on

### Drainage of the Pelvic Cavity of the Male

The author described a method of drainage of the pelvic cavity of the male through the perineum.

The total number of cases treated by him was 19. In all of these there existed a diffuse pelvic peritonitis, with accumulations of purulent fluid, often elevating the distended bowel high into the abdomen, and in two cases ascending between the mesentery and descending colon and overflowing from the pelvis into the left subrenal fossa, which

was also opened and drained. In all but five cases, free pus existed in the space to the outer side of the ascending colon, which in each instance was drained through the ileocostal space. In one case the distended paretic bowel necessitated opening and the establishment of an artificial anus. Three of the cases thus treated died, one after an illness of nearly five months, during which time death was threatened by intestinal obstruction on three or four occasions, while a number of abscesses followed in the abdominal wall. Death resulted from exhaustion incident to the prolonged suppuration. In the second fatal case, death took place ten days after the operation, due to toxæmia. In this case there occurred the first and only untoward results from the procedure, and he believed it to have been directly responsible for the unfavorable termination, for until its appearance the man was progressing most favorably toward recovery, although he was nearly moribund at the time of the operation. On the fifth day, and until his death, there appeared urine in the discharge. The third case died six hours after the operation.

The cases operated upon varied in age from 7 to 52 years. He had had no cases in which there existed enlargement of the prostate. This condition, if marked, would render the procedure difficult, if not impossible.

He had noted a marked tendency toward the development of symptoms indicative of intestinal obstruction following operation anywhere from one week to two months. It appeared in six of the cases, and was interpreted as due to adhesions interfering with intestinal peristalsis. In the management of this condition, he had found that distention of the bowel, with air at intervals, had served him best in bringing about relief.

Perineal drainage had given him better results in the class of cases described than in those previously treated without its employment. To what extent it had contributed, if at all, to the recovery of the patients, in the cases in which he had used it, he was not in a position to say, as in none of them was this method relied on alone, to the exclusion of other drains, but was utilized in conjunction with anterior and ileocostal drainage.

### Discussion on the Papers of Drs. Potter, Macrea, and Jepson

Dr. Charles H. Mayo of Rochester, Minnesota, said he did not care to discuss any of the papers except the one upon tubercular peritonitis. About three per cent of the cases which came for abdominal operation did so because of tuberculosis involving the abdomen, the peritoneum, or conglomerate tuberculosis of the intestine. Nearly all papers written upon tubercular peritonitis said little or nothing about the cause. They treated of the subject of ascites and adhesions, also the question of miliary deposits and adhesions on the intestines lining the peritoneum. Then arose the question of why certain types of operation effected a cure. They had had something over 200 operations for tubercular peritonitis of some type involving the peritoneum. He believed that in all cases where the peritoneum was involved by tuberculosis, it was of mucous membrane origin; that in all the ascitic cases, it was the mucous membrane origin which was closed from any other outlet,—meaning the appendix, or the tube. About four of these cases of tubercular peritonitis occurred in women to one in man, both being subject to the type of appendix trouble, but the excess in women was due to tubal involvement. In their earlier work they tried opening up the abdomen, letting in air and sunlight. Then came the question of emptying the fluid by means of a trocar, and pouring in some agent that would maintain local irritation for a prolonged period, like the use of iodoform. This kept up a process of local leucocytosis for a few weeks. But it required a different type of inflammatory disease and irritation from that produced by tuberculosis. The action of the leucocytes or phagocytes kept up local irritation, which resulted in adhesions. In their early work in operating on these cases of ascites, they opened the abdomen and found the intestines studded with miliary deposits, also the parietal peritoneum, tubes and appendix. In fact, many of the structures that were visible were found covered by tubercles, so that it seemed unnecessary to pick out any particular part for removal, and yet leave so large a part of the gut diseased. In their first operations in which there was considerable ascites, it was found that the fluid was thin, and at subsequent operations more adhesions were present. The ascitic fluid became fibrinous, rapidly clotted, and later there were deposits in women, and these women were relieved of their ascites because of the drying of the peritoneal cavity. The local condition of the appendix or tube became closed from the general cavity because of the adhesions of the intestine. Nature would get rid of the ascitic fluid, and she would caseate the mass, and later on, when these patients returned, say two or three years later, there was a pelvic mass. Where they had examined the abdominal condition during the stage of ascites and had found miliary deposits all over the abdomen, at subsequent operations there would be none of that condition, but a mass of adhesions filling the pelvis. Sometimes they were able to get at and remove a local tuberculosis

by following the round ligament. If the surgeon got into the intestine in trying to get at the pelvic condition, it was impossible to cure such a fistulous process. The intestine could not be closed, and those patients who got fistulæ died from a phthisical condition, from the constant fistulous process which kept up until death took place, so that in the cases which one supposed he had cured, in the sense of getting rid of the ascitic condition, he really had not gotten rid of the original tubercular focus. In all operations made in recent years, whenever they opened the abdomen and found such a tubercular condition, the incision was at once enlarged until they could examine the regions probably involved. This meant the appendix in one fifth of the cases, and the tubes in four fifths. In all that series of cases, they had only had four times, apparently, a lesion in the upper abdomen, as indicated by examining the peritoneum. In four cases they found the disease involving the upper abdomen — three times in men and once in women. In every type of ascitic tuberculosis, or in tubercular conditions of the peritoneum, the first essential feature to cure the case was to get rid of the local lesion and prevent reoperation for the ascitic condition, permit nature to wall in the local tubercular disease, and remove the mucous membrane lesion involved.

Dr. B. B. Davis of Omaha, Nebraska, spoke with reference to the treatment of general peritonitis. He expressed himself as being in accord with Dr. Macrae in many of his statements. He did not believe in flushing, because some of the cases he did not flush did better than those in which flushing was carried out. There was some reason for this, and the way he looked at it was, that when he flushed the abdominal cavity he could not remove all of the toxic material. Methods of flushing were inefficient. Before operation, the peritoneum was covered over by more or less solid material, and consequently the rapidity of absorption was very much reduced, and just as soon as one threw in a lot of water and flushed the cavity, he put the toxins present in a condition of solution, and consequently the peritoneum was put in a condition where there was going to be much more rapid absorption of the toxic material than before. This was the reason why he would condemn flushing.

In the matter of drainage, he used drainage-tubes, but he also employed gauze, and if he were going to use only one, he would use gauze, because it was capillary drainage that counted. The patients sat up at an angle of 45 or 50 degrees. He drained the pelvis; he drained the flanks. Another point in using drainage was, not to stop up the incisions or incision sufficiently so that it would cause the least bit of compression at the points where the gauze and the tube came through the abdominal wall. We should never constrict in any way the gauze as it passes through the abdominal wall. He advocated using a good deal of gauze. The more one used, the more rapidly could he empty the abdominal cavity.

Dr. Van Buren Knott of Sioux City, Iowa, said that during the last three or four years it was a constant surprise to him to notice in the work of various men the various methods of applying peritoneal drainage. Various ideas of the mechanics of drainage seemed to prevail.

As to flushing, he had had the same experience with it in the treatment of diffuse peritonitis as others. In years gone by he sat around and watched practically all of his patients die. He had treated them without flushing and with flushing. He had treated them with gauze drains and tube drains, introduced here and there, with the feet and head elevated, and after trying all of the various procedures, he had come to the conclusion that the method of treatment for these cases was the one he outlined in a paper which he read before the Chicago Surgical Society last spring. He was not willing to discard flushing in favor of gauze drainage. He mentioned a case of a patient who had been operated on for appendicitis in which there was infection. Gauze drainage was used in this case, but the surgeon did not flush. The next night, 24 hours after operation, patient had a pulse of 150 and a high temperature. He had forgotten what the temperature was. The abdomen was greatly distended. Not being able to secure the surgeon who operated on the patient, the speaker was called to see the patient, reopened the abdomen in the midline, washed it out, removed the gauze, put in a drainage-tube, and the patient recovered.

Dr. J. W. Andrews of Mankato, Minnesota, favored drainage in the class of cases under discussion. It was a queston in his mind whether flushing was wise. If the infection was purely local, and one could flush only that portion and leave the patient's peritoneal cavity free from the effects of the flushing, it might result in good. But this was a very difficult thing to do. A few years ago he remembered hearing Dr. James E. Moore, in a discussion, say that gauze would not drain pus, and the speaker was prepared to indorse that statement. He had observed many cases since in which he had used gauze, but it failed to drain pus. Hence he would object to the introduction of gauze through a drainage-tube, but would rather leave the rubber tube open.

As to adhesions, he did not believe that in cases of tubercular peritonitis they should be broken up. In early operations this was done, but patients were lost by it, for the reason that by so doing new avenues of infection were opened up and a principle violated which held good in tuberculous joints.

He was very much impressed with the remarks of Dr. Mayo as regards local tubercular peritonitis. He had operated a few days ago on a girl of 20 for tubercular peritonitis. He found the tubes and the appendix seriously involved, but the peritoneum beyond the tubes and appendix was not implicated. He removed both tubes and appendix, and the patient at this time was making a good convalescence. He believed she would fully recover.

Dr. I. A. Perkins of Denver, Colorado, said that within the last year he had adopted the use of antistreptococcus serum in addition to drainage. He had not flushed, except in one case, and he lost that patient. He did not think the fatality however, was due to the flushing, but to the bad condition the woman was in at the time, as she was practically moribund when she came to him. Of ten cases, this was the only one he had lost. He had given large doses of antistreptococcus serum — 40 cc. at a dose, and in one case 80 cc. This case was one of perforation of the bowel, due to the kick of a horse. He operated three days after the injury, with more than a quart of fæcal matter in the abdominal cavity. He was compelled to use only gauze, as the operation was done in a country town, and he had no drainage-tubes with him. He likes better to combine the drains, tube, and gauze, gauze inside of the tube, or an open tube with gauze coming out by the side of it. Gauze in a tube produced a better capillary effect. The statement that gauze would not drain pus was correct, but in these cases our danger was not from pus when it became thick, as then it was not so infectious. One thing that had assisted him in these cases was a swing for the purpose of holding these patients up. He had had a great deal of trouble in an elevated position until it occurred to him to use an ordinary swing.

Dr. M. L. Harris of Chicago stated that peritonitis was always primarily a local disease; that it started from a distinct local focus. It was one of the properties of the peritoneum, when irritated, to throw out a plastic exudate, the object being to circumscribe the agents which produced the irritation. Whenever we found in peritonitis this exudate, this circumscribed primary focus of infection, we knew at once that the case was not serious, and such patients could be operated on constantly with almost no mortality. The serious case was the one in which, when the peritoneum was opened, there was no attempt at the formation of plastic exudate. When the omentum was found floating free in the cavity, in sero-pus or pus, the case was serious, because there was no attempt made to limit the extent of the inflammation.

### The Free Interval in Meningeal Hemorrhage

Dr. F. Gregory Connell of Salida, Colorado, read a paper on this subject, which appears in the present issue of Surgery, Gynecology and Obstetrics.

### The Effects of Osmic Acid Injections

Dr. Joseph Rilus Eastman of Indianapolis, Indiana, said the injection of ten drops of osmic acid in a two-per-cent solution, into sensory nerve-trunks, was safe. The likelihood of irritation of the kidney, however, should not be forgotten in cases exhibiting kidney lesions. Injections into the inferior dental or other nerves should not be made through the mouth, since infection of the wound and necrosis might result, with consequent failure in the action of the acid. Immediate relief should not always be expected, notwithstanding the cases of Bennett and Murphy were all immediately relieved. No one of the writer's cases, even those in which the acid was accurately injected into the nerve-trunks, and into the perineural fat, was promptly relieved, relief coming in from one to two weeks. The observations on this point of Wright, who has had a large experience with osmic-acid injections, correspond to those of the writer.

There was very little doubt but that the stretching of the nerve-trunk necessarily incident to the injection was productive of good, supplementing as it did the action of the acid. There was no good reason why the stretching should intentionally be avoided, except, perhaps, for experimentation. In the case of small nerves, it would be found exceedingly difficult to inject directly into the nerve-trunk, that is, the needle eye would pass to the distal side of the thread-like nerve, or perhaps not enter the nerve substance at all, or, notwithstanding the utmost care be used, the fibers may be so teased apart by the needle point that the fluid would simply be split about the nerve. In such a case, in order to bring the acid in contact with all of the fibers, it was wise to clip the nerve so that the end may be bathed in the fluids. The effect of manipulation of the nerve, as by stretching, had not as yet been eliminated as a possible aid to the chemical action of osmic acid; therefore

a general anæsthetic should be administered, so that neurectomy or section of the nerve might be practised, if desired.

The writer's experiments had shown no other changes in the nerve tissues as the result of injections of osmic acid, than the disintegration of fat and oil globules in the perineural space and in the white matter of Schwann, such white matter of Schwann being simply fatty matter in a fluid state, insulating and protecting the essential part of the nerve. The degenerations appearing in the nerve itself were only such as may be attributed to nutritional changes and exposure, the indirect result of the selective action of osmic acid of destroying fat. There was no reason why this fat should not be restored, and the nerve again became capable of transmitting sensation, that is, theoretically, the neuralgia may return after injection of osmic acid. Osmic-acid injections were uncertain in effect as to the cure or relief of neuralgias. A large percentage of cases of neuralgia might be relieved for months by osmic-acid injections. The injection of osmic acid for the relief of tic douloureux was quite justifiable, even if it should become necessary to repeat the injections at intervals of a few months, particularly in view of the unfavorable results of the so-called radical operation. The local irritation produced by the acid and the remote toxic and irritant effects were not serious in their consequences, and had no meaning as to the effect of the osmic acid in relieving neuralgia. The solution of osmic acid should be made fresh for each operation, as deterioration was rapid.

### Twentieth-century Surgical Problems

Dr. H. D. Niles of Salt Lake City, Utah, president of the Association, selected this as the title of his address. Among other things, he said that no one who had kept in touch with recent experiences in the surgery of the brain, lungs, pancreas, spleen, peritoneum, and other organs could escape the conviction that with a clear, definite idea of the physiology of these parts, the result of surgical endeavors would be infinitely more satisfactory than we were able to obtain with present knowledge. In brain surgery, many failures could not be charged to any lack of operative skill, but to inability to locate accurately the exact pathology early enough to insure its safe removal or correction. The same might be said of the morbid conditions of the spleen, pancreas, and, in a degree, of the stomach. Until we were better informed by the physiologists of the normal functions of these organs, we could not hope always to differentiate between the normal and the abnormal. The evidence that pointed to the one and excluded the other could come to us only through concentrated specialized efforts which the average surgeon was technically unfitted to undertake.

The line that divided surgical diseases from non-surgical was still somewhat vague and indistinct, and one of the most common sources of errors in the treatment arose from the fact that we are often in doubt as to when and how far we might safely trust to the reparative resources of nature, and under what conditions prompt operative interference should be resorted to.

Thus far, success in surgery had been measured largely by the ability to cope with advanced disease after it had become an immediate menace to life and health. But the time could not be far distant when the importance of recognizing the antecedent pathology of cancer, ulcer, surgical kidney, pus-tubes, prostatitis, and many other grave lesions, would be impressed upon the profession, and the public would be educated to choose preventive rather than last-resort surgery. If we were ever to solve problems that baffled our endeavors to-day and place surgery upon a much higher plane than it now occupied, he thought scientific workers must become more practical, practical workers must become more scientific, and physicians and surgeons must become more nearly united in their ideas of pathology and treatment. And this could be accomplished only by an organized movement tending to bring all workers in closer touch and sympathy with one another.

### Appendicitis

There was a symposium on this subject.

Dr. I. B. Perkins of Denver, Colorado, read a paper, in which he gave further reports from physicians who had suffered from this disease. He discussed the diagnosis of chronic appendicitis and the prodromic stage in acute cases. He expressed himself in favor of early operation in all cases. The interval cases should be operated. Fatalities, he said, were usually chargeable to delay. The management of delayed cases was discussed; also the attitude of the profession and public toward operation.

### Treatment of Appendicitis

Dr. O. Beverly Campbell of St. Joseph, Missouri, followed with a paper on this subject. He said that the reasons why the early operation would never become the universal practice in appendicitis were chiefly the following: (*a*) The family physician was usually called to diagnose and treat the disease in the beginning, and not the surgeon. It was expecting too much of the family physician, when he was looked to to diagnose the disease and

call the surgeon within 24 to 36 hours from the onset of the attack. (*b*) When the diagnosis of appendicitis was made within the first 24 or 36 hours, and an operation was advised, it was necessary to gain the consent of the patient and his friends, which it was not always possible to do within the time limit for an early operation. While the early operation should be the practice in appendicitis when possible, it must be acknowledged that its universal application was impractical, even under favorable circumstances, and one must expect to do the late operation as a life-saving measure, and the interval operation more often than the early. The author drew the following conclusions:

1. In incipient appendicitis, until the patient is placed in the hands of the surgeon, all food and drink should be withheld, and the patient nourished per rectum;

2. Every patient should be advised of the advantages of an early operation;

3. Radical work — that is, the removal of the appendix — or the closure of an opening in the cæcum should be made in abscess cases, when it can be done without additional risk to the life of the patient;

4. The practice of merely draining in every abscess case should be condemned as non-surgical;

5. Operation during a progressive diffuse peritonitis will be attended with a higher mortality than the method of procedure recommended by the writer;

6. That if the internist would direct his efforts in the treatment of appendicitis toward the protection of the peritoneum until he could transfer his case to the surgeon, the mortality in this disease would be greatly lessened;

7. That the adoption of the more rational method of dealing with diffuse peritonitis will convert a large percentage of these cases into circumscribed peritonitis, when they could be rightly classed as large abscess cases, having the same mortality rate.

### TREATMENT OF APPENDICITIS IN ITS VARIOUS STAGES AS IT COMES TO THE SURGEON

Dr. C. H. Wallace of St. Joseph, Missouri, in a paper on this subject, summarized his observations and experience in this wise:

1. That appendicitis is always a surgical disease;

2. That every case should have, and is entitled to, operative measures within the first 48 hours;

3. That the rapidly progressing stage is the stage of applicability of the Ochsner treatment, and by it offers the lowest mortality;

4. That cases coming to the surgeon with evidence of gradually subsiding symptoms should be deferred for a more favorable operative period;

5. That every interval or chronic case should be urged to the operating-table;

6. That abscess cases should be given two safe rather than one hazardous operation;

7. That diffuse peritonitis should have all accumulated dependent cavities primarily and carefully incised and drained and not flushed, and secondarily, the offending organ excised.

### IDEAS CONCERNING THE MANAGEMENT OF APPENDICITIS, BASED UPON ONE THOUSAND OPERATIONS

Dr. Van Buren Knott, of Sioux City, Iowa, read a paper on this subject, and stated that during the years 1893–1905, inclusive, he had operated upon 1,024 cases of appendicitis. Of this number, 640 were clean cases and 384 were pus cases. By clean cases he meant those in which the infection was still confined within the appendix; and by pus cases, those in which the infection had escaped from the appendix and established a septic process, either localized or diffuse. Of the total number, 993 patients recovered and 31 died; a mortality rate of 3 per cent. Among the clean cases, acute or chronic, 640 in number, 639 recovered and 1 died; a mortality rate of $\frac{1}{8}$ of 1 per cent. Among the pus cases, 384 in number, 354 recovered and 30 died; a mortality rate of 8 per cent.

Believing that appendicitis is a surgical disease, he had always been an advocate of immediate operation, and had followed the rule of operating upon every case as soon as seen, unless the patient was practically moribund, with the exception of some few cases, presumably of mild type, in which the patient presented well-marked contraindications to any surgical procedure and it was thought inadvisable to operate under any circumstances. This, in brief, was the plan still employed by him, and increasing experience only tended to further strengthen his belief in it. He classified appendicitis cases into two classes, clean cases and pus cases. the former including all cases, either acute or chronic, in which the infection was still confined to the appendix, and the latter included cases in which a septic process, either circumscribed or diffuse, had been established with the appendix at its point of origin.

After discussing at length the pre-operative treatment and operative treatment of the disease, including a discussion of the infected cases, the author summarized by saying that the best results in appendicitis followed early operations. In clean cases, acute or chronic, the operative mortality was practically *nil*. The hour or day classification of appendicitis should be discarded and a patho-

logical classification substituted. In spreading peritonitis, immediate operation was urgently indicated. In patients already moribund, or in those to whom the added shock of operation would determine a fatal result, operation should be delayed. The elevated posture of the head and trunk, and the resulting accumulation of septic fluids in the lowest peritoneal pouch, from which they were rapidly drained by large-sized tubes, had robbed appendicitis of many of its terrors.

A lengthy discussion followed the reading of these papers on appendicitis, which was participated in by several members, and while nothing new was advanced, yet old points and well-established principles were emphasized.

### Extrauterine Pregnancy

Dr. J. W. Andrews of Mankato, Minnesota, reported having operated on a woman who was ten weeks pregnant; the sac ruptured, and the operation was delayed 36 hours. He reported the case in detail. The steps of the operation he performed were not very different from those of an ordinary laparotomy. He argued in favor of accuracy and rapidity in operating in these cases, and emphasized the necessity, in many cases, of thrusting the hand down through the pool of blood and securing the blood-vessels before attempting to mop out or otherwise remove the blood and blood-clots. He thought drainage, as a rule, should be employed after laparotomy for extrauterine pregnancy.

### Post-climacteric Hemorrhages—Their Cause and Treatment

Dr. A. L. Wright of Carroll, Iowa, called attention to the frequency of occurrence of post-climacteric hemorrhage after the establishment of the menopause. He spoke of how often it was passed over slightingly, with the thought that it was incident to the woman's age, until grave complications were at hand, or the true cause, carcinoma, in more instances, was so far advanced as to place the patient beyond the pale of surgical interference. Dr. Wright called attention to the several changes that took place in the uterus at this time, and which cause hemorrhage. The trend of his argument was to recognize early the pathological changes taking place in the uterus, and if in doubt, to remove the organ, rather than take chances that would invariably result in death.

Dr. J. N. Warren of Sioux City, Iowa, contributed a paper on

### Gunshot Wounds of the Stomach

The author went exhaustively into the literature of this subject, and said that, as regards injuries of the stomach, the literature was meager and indefinite as to the character, location, and complications. The symptoms of injury to the stomach were in some cases easily interpreted, but in others there may be great difficulty in making a diagnosis.

He reported three cases.

Case 1. O. W., aged 19; weapon, revolver, 48-caliber. Patient accidentally shot. Point of entrance three inches to the right and two inches above umbilicus. He reached patient one hour after the receipt of the injury. Patient died in a few minutes. Post-mortem examination revealed a large amount of blood in the abdominal cavity, which came from a wound in the coronal artery. The bullet passed through the cardiac end of the stomach, high up.

Case 2. Young man, 18 years of age, was cleaning a revolver, supposing it was not loaded. The weapon discharged, the ball passing into the abdominal cavity. The point of entrance was two inches to the left and a little below the umbilicus. The accident occurred between 9 and 10 P. M. At the time of the accident he was in a small house, alone, shortly after which he walked to a neighbor's, half a mile distant. Dr. Frear of Sloan, Iowa, was sent for. The speaker reached the patient at 7:30 A. M. of the next day. There had been no vomiting, and patient suffered but little pain. There was slight shock. Pulse was 98, fairly good; temperature normal. Patient had been given whisky and water freely before Dr. Frear reached him. There was evidence of fluid within the abdominal cavity. Patient was sure that he held the revolver in such a position that the force of the bullet would go downward and outward toward the right hip from the point of entrance. Patient was anæsthetized with chloroform, and a small incision was made along the left edge of the rectus muscle, commencing near the umbilicus. As soon as the peritoneum was incised, a free escape of fluid took place, which had the odor of whisky. The incision was rapidly enlarged upward. The liquid was removed with gauze sponges. The wound was in the anterior wall of the stomach, about midway in transverse and long diameters. Patient suddenly died from the effect of chloroform. Further examination showed a wound in the posterior wall on a line somewhat higher. There were no intestinal lesions.

Case 3. W. J., aged 12, injured, 1904, by a bullet from a 22-caliber rifle. Point of entrance was two inches to the left and one and a half inches above the umbilicus. The bullet lodged under the skin of the abdominal wall, three inches to the right, on a line of the upper border of the umbilicus. Patient was visited by Dr. F. S. Johnson

of Sioux City, who had him removed to the St. Joseph's Hospital. The author saw the patient at 6 P. M. and found him suffering from shock; pulse 120; temperature subnormal; body covered with perspiration. He had vomited freely; contents of stomach mixed with blood. While going under the anæsthetic (ether), he vomited quite a large amount of fluid, which was mixed freely with blood. A median incision was made from below the ensiform cartilage to the umbilicus. A wound was found in the anterior wall of the stomach. Point of entrance was about two inches in front of the cardiac curvature, and the point of exit near the pylorus, with quite an area of ecchymosis. There was some transudation from this wound. Both wounds were closed by two layers of Lembert's sutures, fine silk being used. While the patient was under anæsthesia the stomach was washed out and a considerable amount of blood removed. The wound through the abdominal wall was trimmed and closed. The abdomen was closed without drainage. Patient was very restless and had some temperature for three days, after which he rapidly recovered.

In closing, the author said that one fact was well established, whether in simple or complicated cases: that the earlier an operation was performed, the greater the percentage of recoveries. In civil practice this rule should not be deviated from.

Dr. S. C. Baldwin of Salt Lake City, Utah, followed with a paper entitled

### The Symptoms of Spinal Disease

Believing as the author did that lateral curvature, scoliosis, spondylolisthesis, etc., were conditions that were not due to disease except in rare instances, but rather to faulty position from one cause or another, long-continued, or from traumatism, it was the early symptoms to which he called attention, in order that suffering might be earlier relieved, and deformity avoided. The general or more common symptoms, and then such symptoms as rigidity, gait, pain, paralysis, abscess, etc., were considered. This elimination narrowed the subject down almost to the symptoms of Pott's disease.

In the cervical region the first symptom noticed might be pain in the head, and Whitman says that earache might be a symptom of cervical disease. Besides this, and before there was any sign of deformity, the patient might complain of difficulty in swallowing, and even in breathing. In the cervical region there might be, and often was, the grunting respiration. Such general symptoms as weakness, loss of appetite, loss of weight, rigidity, and general change of gait in walking were apparent in disease of all parts of the spine.

Probably the first thing to attract attention would be a slight weakness displayed by the patient. The author did not say child, because he was convinced that a large number of these cases occurred in adults, and that the number of adults so affected was increasing. This might be because of the better conditions which surrounded children now as compared to years gone by. He had seen a number of cases of Pott's disease developing in patients over forty years of age, and two cases which he recalled developed after fifty. This weakness might show itself in a general drooping of the trunk, in an unsteady and stumbling gait, and exhaustion requiring rest after the slightest exertion. After this an examination would usually show rigidity of a greater or less degree of some portion of the spine. The entire spine might seem to be more supple than usual and entirely painless, as was the condition in a case that recently came under his observation.

The author cited cases in point.

### Gastric Dyspepsias Amenable to Surgical Treatment

Dr. William E. Ground of Superior, Wisconsin, said it was now recognized that many forms of digestive disturbance were dependent upon conditions entirely outside the stomach, and involved this organ either by direct extension of the pathological process or indirectly by nerve influence. Among these might be mentioned inflammatory or irritative conditions in the biliary apparatus, pancreas, duodenum, or appendix, and adhesions of the stomach to the surrounding viscera. Within the stomach, conditions remediable by surgical means were perforative and non-perforative gastric ulcer, chronic gastric ulcer, hemorrhage, pyloric obstruction, gastric dilatation with stasis, hyperchlorhydria, and cancer. The question of operative interference in some of these conditions was still in dispute, but the wisdom of referring cases of perforating gastric ulcer with or without adhesions, cicatricial stenosis of the pylorus, adhesions of the stomach to any or the surrounding structures, and perhaps chronic gastric ulcer, to the surgeon was now pretty firmly settled.

Closely associated with ulcer was the sequence of cicatrization and contraction, and when this process involved the pylorus it led to stenosis and obstruction, and later, if this was prolonged, gastric dilatation and atony would result. When the pylorous was obstructed by spasm due to the presence of the ulcer or to hyperchlorhydria, which almost always accompanied non-malignant ulcer, or to the cicatricial contraction following the healing of an ulcer, the pylorus was rendered inca-

pable of readily transmitting its contents, the stomach became distended, and its muscular walls weakened, leading ultimately to permanent atonia gastrica. Stomach dilatation might be due to atony alone, but it was much more frequently due to mechanical obstruction at the pylorous. In this condition of gastric stenosis, food may remain in the stomach a day or more, whereas it should empty itself within seven hours at the most. In fairly advanced cases, when the obstruction had given rise to a compensatory hypertrophy of the stomach, the peristalic movements may be seen and felt through the abdominal walls, usually accompanied by pain and vomiting. Later, when the stomach began to dilate and assumed a more passive state, the patient complained of fullness and epigastric pains after meals. Fermentation took place causing eructations and heartburn, and frequently vomiting. Vomiting was a most prominent symptom when gastrectasis and fermentation were well established. When this sequence of events was set up, there was but one remedy, and that was surgical intervention.

In view of the information of the curative effects of operation, they could not be attributed alone to drainage of the stomach or to short-circuiting of the food current, as was so often contended, for, unless the pylorus was closed, food would pass through it. The explanation the author had arrived at was to the effect that the cutting off of the circular fibers in the pyloric end of the stomach did away, to a considerable extent, with the muscular unrest accompanying gastric digestion, especially where ulceration was present.

According to the author's way of thinking, a gastroenterostomy acted much the same as cutting the fibers of the sphincter ani in anal fissure. In this latter condition the fæces continued to pass over the ulcer, but the paralyzed sphincter prevented friction, and it healed rapidly.

### Gluteal Cavernous Angioma

Dr. J. E. Summers, Jr., of Omaha, Nebraska, read a paper on this subject, which appears in the present issue of Surgery, Gynecology and Obstetrics.

### Restoration of the Perineum

Dr. Howard Hill of Kansas City, Missouri, said that the perineum is divided into three layers: a superficial sphincter layer, a middle ligamentous layer, and a deep layer consisting of the levator ani muscle and its fascia. An ideal operation consists in restoring the different planes of tissue to their normal position. It matters little which incision is used to expose the structures mentioned, but he has employed a transverse incision which consists in raising a flap of the posterior vaginal wall and has done the operation by using three layers of sutures. The first includes the levator ani and its fascia, reattaching that portion of the muscle which helps to form the perineal center in front of the rectum. Next he identifies and sutures the triangular ligament and attaches the sphincter ani to the perineal center. A single suture is used for the bulbocavernosus.

Dr. A. W. Abbott of Minneapolis, Minnesota, read a paper entitled

### Pre-operative Thrombi in the Region of the Field of Operation as a Cause of Post-operative Complications and Death

This paper appears in the present issue of Surgery, Gynecology and Obstetrics.

### Conservatism in Post-operative Treatment

Dr. S. C. Beede of David City, Nebraska, referred to the increasing tendency among surgeons to hasten their patients out of bed and hospitals after grave operations. His attention was first directed to this matter when members of the laity began to mention frequently the shortness of time patients were detained by this or that surgeon. Nurses would speak with pride of the fact that their favorite operator would send a hernia or an appendix case home in two weeks. Then another one, not to be outdone, made it twelve days instead of fourteen. Another, to make a better showing than his competitor, shortened the period of disability to ten days, only to be met by a more daring rival with an eight-day period for a clean abdominal section. This, he said, was not the limit of extravagance in this strife to make it appear easy to be operated, but patients, after extensive abdominal operations, had been carried out of bed and placed in a chair on the third day, and allowed to walk about the room on the fourth. It was creditable that the many weeks in bed, once necessary, could now be avoided by a more perfect technique, especially in the matters of more perfect control of hemorrhage, aseptic precautions, discarding irritating antiseptics, avoiding unnecessary traumatism and care in suturing and suture tension. These gave the best possible opportunities for nature to do her reparative work, but nature would work only so fast, and he thought there was a limit in time beyond which it was unsafe to urge her. His contention was that this limit had been overstepped, and that the perfect result which should be the aim in every case was thereby marred.

### Tuberculosis of Bursæ and Tendon Sheaths

Dr. J. Clark Stewart of Minneapolis, Minnesota, contributed a paper on this subject. He

said that these lesions were fairly common in the Northwest, and deserved attention on account of their frequent misdiagnosis and consequent bad treatment. Such local tuberculoses may arise either by direct entrance of tubercle bacilli into the blood from digestive tract, with later localization, or as the result of dissemination from a pre-existing tubercular adenitis. There were three distinct varieties of these local lesions, differing quite widely in their pathology, but little clinically. The prognosis of tubercular tendo-synovitis varied much with the nature of the pathology and treatment. Ideal treatment was complete excision in all cases. Incision, evacuation, carbolization, and closure without drainage gave equally good results in many cases.

### Consideration of the Technique of Laminectomy

Dr. Harry M. Sherman of San Francisco, California, in a paper contributed on this subject, contrasted the operations of osteoplastic laminectomy with the laminectomy which does not save the laminæ, both when the operation is done in the dorsal spine and when it is done in the cervical spine. The author argued that the osteoplastic operation is the correct one for the dorsal spine, but that the saving of the laminæ in the cervical spine is unnecessary. The osteoplastic operation is appropriate to the dorsal spine, because the laminæ are important to keep the erector spinæ group of muscles, collectively and individually, on the convexity of the dorsal curve, so that they can effectually act as extensors of the spine. The preservation of the laminæ in the cervical region is not necessary, for the cervical region is concave porteriorly, and the muscles pass across the concavity, as cords of the curves, and are always efficient extensors. A case of laminectomy in the cervical region for a tumor of the cord was reported to illustrate the points.

### Can the Results of Cancer of the Breast be Improved?

Dr. Beverly MacMonagle of San Francisco, California, said that great as had been the advances in treating cancer of the breast in the past four years, there was still room for improvement. X-ray, radium, and serum treatment had been tried and found wanting. The very best results were obtained by surgical operation only. These had been so good, that surgeons were prevented from attaining a high percentage of cures only by the fact that the cases reached them too late to get the full benefit of surgery.

Why do the cases reach surgeons so late?

1. Those who have lumps in their breasts do not understand the risks they are running.

2. They have a dread of surgical operations, due to ignorance or the knowledge of failures among some of their friends.

3. They do not discriminate between one operated upon early and radically, and one operated upon late and incompletely.

4. They were misled by honest physicians and surgeons, who do not insist on making an exact diagnosis of the nature of all lumps in the breast.

The only way to correct the above conditions was for every surgeon to insist on exact diagnosis in all cases of lumps in the breast in the very beginning, not to wait until the classical diagnostic points were present. This could only be done by making an incision, removing the lump, and having a microscopic examination made by a competent microscopist while the patient was still under the anæsthetic, and everything prepared for a radical operation. The time required for the frozen section is only about ten to fifteen minutes. If there is the slightest doubt, the radical operation should be done, thereby giving the patient the benefit of the doubt.

Following the above plan, the author has had eighteen patients in whom the lump was small and, as he thought, benign. There were no symptoms or signs by which he could say the growth was malignant. He explained to the patient its nature, removed the lump, decided by the microscope, and proceeded according to the findings, thereby removing doubt as fully as possible. Sixteen of those cases proved malignant and two benign. The radical operation was done in all sixteen cases. All the cases made satisfactory recoveries, and had no complaints to make in regard to the condition of the hand and arm. The longest time that had elapsed since operation in these cases was five years; the shortest, one year. This was not sufficient time to say positively that the patients had been cured. However, the fact that careful microscopic examination was made of the axillary contents and mass, and no malignancy found except in the particular lump in which it was found at the time of operation, the present health and comfortable condition of the patients are reasonable assurance in regard to the future.

The above exact diagnosis having been made, the most that treatment can yet do has been done. In doing the operation to remove the tumor for microscopic examination, he said great care is necessary, as the danger of reinoculation is very great.

In a case in which he considered the tumor in the breast innocent, he removed the tumor by

cutting down to it and carefully dissecting it out, closing the wound, which healed by first intention. Careful microscopic examination showed that he had been in error and that the tumor was malignant. He explained his error to the patient and advised immediate radical operation. This was declined. In three months the patient returned for examination. He found an enlarged and tender gland just at the lower edge of the pectoral muscle. He again urged radical operation; it was again declined. In six weeks the patient returned; the gland enlarged, and still quite tender. He could find no other glands. Operation was accepted this time and done at once. The dissection was carefully made. Two glands were found in the axilla, in addition to the one found before operation. On examination, all these proved to be carcinoma. In about four months from the second operation the patient returned with the glands in the neck on both sides and those in the mediastinum enlarged and rapidly increasing in size, with difficult respiration and severe pain. Inside of three months the patient, after great suffering, died.

Here was a case of reinoculation at the first operation and rapid advance between the second and radical operations. Therefore the danger of reinoculation is very great, and more likely to occur than many are inclined to think.

Since then he had followed the plan of raising the whole breast, covering the muscles, etc., with gauze, and either making cuts to remove with a cautery knife, or cauterizing thoroughly with carbolic acid as soon as the cuts are made. Since following these plans he has not had a case of reinoculation.

He referred to a patient just operated upon, in whom the gland and the skin over it just outside the nipple as large as a half-dollar, and the axillary glands were involved. Patient was fifty-four years old. She said she had first noticed the lump when thirty-four years of age. Two years ago it began to enlarge slowly. Here was a case in which the lump was malignant, remaining stationary for eighteen years, or benign, becoming malignant after that time. He thought this went to prove the danger of allowing such cases to go on until the diagnosis of cancer could be made by the usual examination.

### CONCLUSIONS

1. All tumors of the breast are a threat at the well-being of the patient.

2. Positive diagnosis cannot be made in the early stages without microscopic aid.

3. All tumors of the breast should be removed with care, to prevent reinoculation, a microscopic diagnosis made, and radical operation proceeded with at once, if found malignant. This method gives the best chance of improving the results of surgical treatment of cancer of the breast.

### OFFICERS

The following officers were elected for the ensuing year: President, Dr. Malcolm L. Harris of Chicago, Illinois; First Vice-President, Dr. A. L. Wright of Carroll, Iowa; Second Vice-President, Dr. C. Lester Hall of Kansas City, Missouri; Secretary-Treasurer, Dr. Arthur T. Mann of Minneapolis, Minnesota.

Salt Lake City, Utah, was selected as the place for holding the next annual meeting.

# ABSTRACTS OF CURRENT LITERATURE

## DEPARTMENT OF SURGERY

UNDER THE CHARGE OF

JOHN B. MURPHY, M. D. — E. WYLLYS ANDREWS, M. D.
FREDERIC A. BESLEY, M. D. — WM. R. CUBBINS, M. D.

### CONCERNING CARCINOSIS OF THE THORACIC DUCT. By Theodor Schwedenberg.

In 1898 Winkler summarized the literature of this subject to that date, and reported twelve of his own cases in addition. He considered the pathological condition very rare. Schwedenberg has collected seven more reported instances since 1898, and adds to these twelve new cases of his own. Ten of these had tumors of the abdominal cavity, one had double carcinomas of the hepatic flexure and of the mammary gland, which was of extreme interest because of the localization and spread of the metastatic growths, and the other had a carcinoma of the breast only. This last case offered the remarkable example of retrograde infiltration of the thoracic duct. The duct in all twelve cases was found in its typical position, with little variation in its anatomy, but pathologically it was in some instances completely filled with tumor masses, and in others invaded only in single location by small nodules. The lumen showed variations from complete obliteration to absolute patency. In five of his cases there was a distinct thickening of the duct at the level of the aortic arch. Microscopically, cells were found adherent to the wall, covered with thrombi, or inclosed in clots. Other times solid tumor masses filled the lumen, or small nodules were found. The point is made that a thoracic duct which, macroscopically, appears to be carcinomatous does not always prove so microscopically. The most likely manner in which the cells arrived at the duct was probably inclosed in thrombi, which were caught somewhere, became organized, and thus the cells bould spread. The infiltration might, however, ce primary and the thrombi secondary. Among the twelve cases, metastases were brought about through the blood-vessels in six. This occurred partly because of the direct connection by the thoracic duct of the blood and lymph systems, and partly by the breaking of tumor elements into small blood-vessels. The author believes that but few arose by paradoxical emboli. If the ducts should be completely closed by carcinomatous growths, other accessory lymph-channels gradually take up the work of transporting the lymph and its contained elements, otherwise an extravasation of chyle would be more common. It may also be that after thrombosis in the duct, organization of the thrombus or necrosis of the cells may again open the channel. Schwedenberg concludes that carcinosis of the thoracic duct is by no means rare. It occurs by direct transport of cells from an organ of the abdominal cavity. But even though the duct is not carcinomatous, it is the chief avenue for cancer-cells passing from abdomen to chest. By retrograde flow, or, what is more common, through the right heart, the tumor elements enter the lungs, which they pass often without forming secondary tumors.—*Virchow's Archiv.*, bd. 181, h. 2, 1905, S. 295.

### WHAT ARE THE PROSPECTS FOR MAKING AN EARLY DIAGNOSIS OF CARCINOMA OF THE GASTRO-INTESTINAL TRACT? By I. Boas.

Boas considers carcinomas of the stomach, the colon, and the rectum. In 84 cases of the latter, seen from 1896 to 1905, only 20 operations were performed. In other words, in 80 per cent removal was no longer possible. Even among the operative cases some were not favorable, while among those adapted to surgical intervention only a small part could be looked upon as diagnosed early. Boas gives as a reason for the advance of the growths, that many patients are not examined per rectum, that they have only slight symptoms there, and that many with optimistic view-points do not consult the physician early. He determined how long the symptoms had existed on presentation of the patient. In nine patients they had lasted less than three months; in six, three months; in seven, four months; in two, five months. Among the nine cases of less than three months' duration, four were at that time inoperable, and of the remaining five, two were practically so. On the other hand, those with initial symptoms of older date, some were easily operable.

Boas therefore draws the conclusion that the kind of carcinoma and its characteristics of propagation play a more important rôle than is usually assumed.

He had statistics upon thirty cases of colon carcinoma in different locations along the lower bowel. Fifteen operations of various natures were performed. Concerning the first symptoms, there are many difficulties. In a large percentage he noticed that patients had some disturbance of the bowels for years. In three cases, the first characteristic symptoms, obstipation and occasional colicky pains, existed two or three years, in one for six years, and in a third for eight years. Although it is known that colon carcinomas are characterized by an extraordinarily slow growth and a sort of benignity, a developmental period of six or eight years opposes the ordinary clinical experiences with visceral carcinomas. In many cases, however, it was impossible to trace the beginning of the growth from the complaints of the patient, and therefore the following tabulation is only approximate. In five patients, symptoms had existed less than three months; in two, three months; in one, four months; in three, five months; in four, six months; in five, between six and twelve months; in five, more than one year; and in five more it was impossible to determine. Among six resections, two cases were successful, and in one of these a preliminary anastamosis had been performed six months previously.

Two hundred and eighty-four instances of stomach carcinoma are summarized. In thirty-four cases, symptoms had existed for less than three months, and in twenty-six for three months. Among these sixty, eighteen were operated, but only three, five per cent, could be resected. For the periods of four, five, and six months there were seventeen, seventeen, and twenty-two cases, with five, two, and no operations, respectively. No resections were possible in the cases in these groups. In seventeen cases, symptoms had existed for more than six months. Five operations were done, and of these three were resections. Sixty-four cases were found in the period of seven to twelve months after initial symptoms, and eleven operations were performed, of which resection was possible in three. With more than one year of symptoms, there were forty-six cases, seven operations, and two resections. Therefore in these 127 patients who came to observation after six months of previous symptoms, resection was still possible in eight, or in 6.3 per cent. From these figures it can be learned that patients do not always come too late for treatment, for sixty, or 24.7 per cent, came within three months. When the question of the operability of the early cases is considered, it is found that in the sixty early ones, twenty-three were pylorus cases, and only three could be resected. To be exact, it must be remarked that of the remaining twenty some refused operation, but the statistics give no definite data upon this point. Among the seventeen which were seen after four months' growth, only gastroenterostomy was possible in two, and in most of those not operated, many had metastases in the liver. Therefore the fact follows that the early diagnosis does not guarantee the possibility of a radical removal. As in rectum carcinomas, these tumors of the stomach may be of such malignancy that a few weeks may suffice to render operation futile. These facts are more clearly illustrated by comparison with those cases recognized late and operated upon. Reference to figures show that the usual belief that late treatment means bad prognosis is not carried out. Among the 127 cases, eight resections were possible, or 6.3 per cent, or a higher percentage than in the early period. It follows again, therefore, that the early recognition of a stomach carcinoma does not offer a good chance for operation, nor that late determination, as a rule, precludes a possible radical procedure. The kind of carcinoma and its malignancy plays a great and deciding rôle.

It is agreed that if a carcinoma is diagnosed four weeks after first symptoms, a favorable result can be expected from operation, but Boas shows by case histories that as early as three or four weeks so generalized a carcinoma and so prominent a cachexia may be at hand that a radical operation would be out of the question. Concerning the palpability of the tumor the author states that those instances where no tumor could be felt offered no more favorable outlook than those in which it is palpable. Even the stomach contents analysis, which has offered much aid, may be ambiguous and give only a conclusion of probability. Gastroscopy is valueless, for, even though the tumor could be seen, no information would be given of metastases or other complications. An incision for diagnosis, which is the surest and safest method, is, unfortunately, not popular, and will always have a restricted use, and by this procedure the problem of early diagnosis is not solved. Boas urges observation-stations for those suspected of having carcinoma. In closing his paper he answers the question put in the title-page, in this way: that the prospects are not favorable, and may not be more so by further research, for the stage in which a really early diagnosis is possible lies beyond our skill. The malignancy of the carcinomas of the gastro-intestinal tract lies not only in the neoplasm, but, above all, in the latency of its growth.—*Mitteilun-*

*gen a. d. Grenzgeb. der Med. und Chir.*, bd. 15, 1905, S. 73.

EXPERIMENTAL CONTRIBUTIONS TO THE ETIOLOGY OF PRIMARY DEATH FROM BURNS. By Dr. Herman Pfeiffer.

The author reviews the older theories regarding this subject. Edenburger held that retention was the cause. Wertheim and Ponfick looked to changes of the blood, Falk considered loss of heat, and Baraduc and Tappeiner thickening of the blood, as the active etiology. Sonnenburg believed in a reflex theory. All of these older hypotheses stand sharply against the newer ones, which have as a foundation the development of a toxic substance. Lustgarten was the first to recover from the organs of burned individuals a poisonous product, the result, he believed, of a bacterial decomposition of the burned and purulent skin. Reiss demonstrated the urine of burned people to be toxic and the death autotoxic. Some authors believe the poisonous product to be a converted albumin molecule, and still others conclude that the cause of death is to be traced to a ptomain generated by the heat alone at the injured localities. One investigator, from positive inoculation experiments with small pieces of cooked skin, asserts that burning develops some poison. One recent searcher says he has discovered hemolysins and agglutinins in the blood of burned animals, and another compares the action of the poison to abrin, ricin, and to eel blood. One of the latest writers represents the old-time shock theory.

Among the findings that seem to be universally agreed to in such cases are the following: Changes in the erythrocytes; hemoglobinæmia; hemoglobinuria; cerebral disturbances; poisonous products in the urine and blood serum; gastrointestinal changes. Experimentally, it has been determined that the prevention of the flow of blood to the region of the burn acts prophylactically, and that the immediate removal of burned tissue hinders death, but that such an operation later is without effect. Post-mortem, there have been generally found pronounced parenchymatous and fatty degeneration of glandular organs, hyperemia of the abdominal viscera, ecchymoses and ulcer of the gastrointestinal tract, and recovery of toxic substances from the organs.

The author experimented upon over seventy animals by anesthetizing them and scalding certain measured portions of the body. The blood and urine were carefully collected and examined, and many chemical analyses were made. In a few of the animals, death followed shortly after the burning, probably due to shock. Within the first twenty-four hours there are changes in the corpuscles of the blood and a hemoglobinemia, which disappear after this lapse of time. The urine is at first hemorrhagic and later albuminous. The pathological changesa re the more intense the longer the interval between the scalding and the death.

After having demonstrated that normal urine and serum injected subcutaneously into laboratory animals are innocuous, the author found that if he introduced urine or serum from the artificially burned rabbits, he obtained death in some, and in larger animals necrosis and ulcers. This poisonous action was never present in the urine in the earlier hours after the burn, and in the first 24, only in 20 per cent. The longer the interval, the larger the percentages of toxin were found, until after the fifty-sixth hour, when this content grew less. This toxicity is independent of the amount of hemoglobin dissolved. The poisonous principle appears earlier in the urine than in the serum.

This toxic substance showed an intense action upon the central nervous system, beginning with excitation, then showing paralyses, and ending with death from cessation of respiration. Other experiments showed only a local necrotic action. Some of the poison acted upon the intestinal canal, illustrated by hemorrhages and diarrhœas. By lessening and increasing the doses, the results were respectively avoided or intensified. The toxic product was destroyed by direct sunlight and daylight. Heat also disintegrated it, but when dried its virulence was retained. It passed through ordinary bacterial filters. In white mice the poison acted from the intestinal canal, but it was powerless on uninjured skin and mucous membrane.

The author denies the action of any agglutinin or hemolysin. What the toxic substance is he cannot say, but he asserts that it is not a ptomain nor any of the pyridin bases. It is a very labile body, of unknown chemical structure, which has many identities with and also differences from the snake poisons and the nucleoproteids. He made extracts from the organs of these experimentally burned animals and found varied results; some of these toxins so obtained being thermostabile and some thermolabile, the former being the neurotoxic principle, which then showed no local reaction. These findings were made less conclusive by the discovery that the organs of normal animals, when treated in the same manner, gave a substance which, when injected in corresponding larger quantities, gave similar phenomena as when urine from burned animals was introduced. This fact suggested the theory that there is a sort of " normal toxin " identical with the " burning toxin," and that in cases of burns there is an over-

production of the former and a retention of the same by the kidneys.

Concerning the origin of the poison, the author states that he was unable to recover any immediately from the location of the burn or from coagulated albumin, and, after experiment, determined that Weidenfeld's conclusions from his experiments of introducing cooked pieces of skin into the peritoneal cavity are not justified, and that such results have nothing in common with death from burns, because there is no toxin in the urine.

The changes in the erythrocytes he lays only to the destructive action of the high temperature, and he believes that the changes in the gastrointestinal tract are due to the action of the toxin. In proof of this he refers to the bloody diarrhœas and hemorrhages obtained in his experiments. A similar explanation is offered for the degeneration of the heart muscle and the kidneys.— *Virchow's Archiv*, bd 180, 1905. S. 367.

CONCERNING NERVE COMPRESSION By DR. E. H. VON LIER.

The author prefaces his remarks by the statement that a nerve trunk which has become functionless because of pressure from a callus or connective tissue may regain its activity as soon as this pressure is removed. His experiments were suggested by a case of median nerve paralysis, which was caused by an old incised wound and cured by two operations.

After a review of literature pertaining to the subject, he repeated some of the experiments. The frog was used. The sciatic nerve was bared and varying pressure brought to bear unon it. His results are here summarized.

A two-hundred milligram gave lessened excitation, while heavier weights increased it at first; but the contraction was never so intense as in the first instance. By increasing the pressure, the contraction lessens, and the maximum action of the muscle after each excitation is universally proportioned to the load, when the interval between and the duration of the current are equal. The contraction lessens rapidly with heavier weights and less abruptly when the latter is added gradually. The return to normal requires a longer time the heavier the imposed pressure. When, because of a great weight, the nerve no longer transmits, the contractions of the muscles can be recovered by a more powerful current, which demonstrates that no lack of continuity of the nerve obtained. The author determined that the latent interval between contractions is not changed by pressure. Longer action of light loads is more harmful to the nerve than a short action from heavier weights, though many varieties were noted. The interval between the return of the activity of the nerve after its disappearance was different,—from five minutes to six hours,—but after this pause the contraction never reached that at the beginning.

The author fixed a piece of nerve while submitting it to pressure and sustained it by Marchis's method. Macroscopically, the point of pressure seemed very thin and transparent and the adjacent regions thickened somewhat. Microscopically, it was shown that the nerve fibers at the location of the insult were hard to distinguish, because of change of form. The relation of the axis cylinders to their surrounding envelopes was altered, showing bizarre forms, but the quality of the changes depended upon the amount of pressure. No definite degeneration of the nerve elements is mentioned.— *Beitrage zur Klinischen Chirurgie*, bd. 46, 1905, S. 711.

A PROCEDURE FOR OPENING THE PERICARDIUM. By J. H. Bacon, M. D.

The subject of pericarditis is first considered from a pathological standpoint.

The technique of the proposed operation is given.

A skin incision is made parallel to the mid-line of the sternum and ½ cm. to its left, extending from the level of the upper border of the fifth costal cartilage to the lower border of the sixth. This incision is deepened until the sternum is exposed. This is laid bare over an area of 2.5 cm. and the periosteum is raised. With a trephine 2 cm. in diameter, a circular window is made in the bone. One opens upon the anterior mediastinum, and the prepericardial fat then comes to view. The fat is dissected away and the anterior surface of the parietal pericardium is exposed. The pericardium is raised with forceps, and an incision is made between them. Exploration and treatment can now be instituted.

The advantages presented by this procedure are:

1. It is anatomically correct.
2. Easy approach to the pericardium by definite landmarks that are readily made out.
3. The best possible drainage afforded.
4. It permits a ready inspection of the heart and the pericardial cavity.
5. It is devoid of mechanical danger, such as hemorrhage and rupture of the pleura.
6. It can be done under gas anesthesia.
7. It requires but five to fifteen minutes for its completion.
8. No after-deformity.
9. Least possible danger of spreading infection to the pleural cavities or to the peritoneum.— *American Journal of Medical Sciences*, Oct., 1905.

CONCERNING THE INDICATIONS FOR CONSERVATIVE AND OPERATIVE TREATMENT OF JOINT TUBERCULOSIS. C. Garre.

Garre recites his experience of ten years in Rostock and Königsberg upon this subject. As an introduction he emphasizes the important rôle of general treatment. For local treatment he employs fixation dressings, mostly plaster, but uses others. He asserts the orthopædic apparatus does not guarantee real rest, and is tootoften not carefully fitted. He puts much faith in ten-per-cent iodoform emulsion injected into aspirated abscesses and into joints. Only a few cases have been treated by Biers hyperæmic method, but these have been convincing, and he hopes for good results with this treatment. In children, and in people over fifty years of age, conservative treatment is indicated. He mentions that social conditions may often contraindicate conservative treatment, and that the practical thing to do amidst poor surroundings is, in many cases, resection. The local conditions determine the therapy, for, in general, the severe fistula cases and those with fever and much pain go to operation early. The presence of a tuberculous abscess is no indication for operation. It is to be emptied as soon as possible and filled with iodoform emulsion. The results from this procedure are as satisfactory as the conservative method can be, and if resection must eventually be done, the injections influence in no unfavorable way. It is different when abscesses have been incised, for secondary infection is then always present, and this makes any subsequent operation of less favorable prognosis. Even with the various fistulæ one must individualize. Some may be healed by curetting or with conservative treatment. Others, because of a profuse discharge, are dangerous to the general condition of the patient and also to his surroundings. When the skiagraph shows sequestrations, the prognosis for conservative treatment does not become so good, although the possibility of encapsulation is not removed entirely. When there are extra-articular or extracapsular areas of bone, operation is the only course.

Garre considers the affection in all the larger joints of arm and leg. Most of the shoulder cases were treated by injections with healing, but with stiff joint. His resections were not any better. Only the worst cases were operated on, mostly caries sicca. No operative case came to his hand in which the deltoid was not already functionless; a possible explanation for his poor operative results. He allots less to conservative treatment in the elbow. Early cases are injected, and in children under ten years of age he continues this, even if four or six injections show no improvement. He always fixes the joint in the non-operative cases, and expects no movable joint. In severe cases, with fistulæ, abscesses, etc., he believes resection is indicated and gets healing with a nearthrosis, which, with proper care, gives good results. In no joint case can so much be attained by iodoform injections as in the wrist. In the majority there occurred healing and excellent function. This result was obtained even in the worst cases. In every resection the function of the fingers leaves much to be desired. The tendons lose their movability, and become too long by removal of the carpal bones, and even by attempts to overcome these objections, the operative methods fall far short of the conservative ones, considering the function of the hand. In tuberculous coxitis he gives the conservative treatment the preference. In the pure fungoid form the injections are most efficacious, but are reserved for the abscess forms, and even in the presence of sequestra or destruction of the head of the bone, this treatment is carried out. Resection is indicated in fistulous cases, and especially when sequestrations are present, and, to avoid secondary infections, when, in spite of good treatment, the general condition becomes worse, and the local does not improve. In the affections of the knee, the conservative treatment had given least satisfactory results, in spite of the fact that eighty or ninety per cent so treated were mild cases. The operative treatment gives much better figures.

Among 185 cases, 94 per cent were successful in one way or another. Synovectomy is indicated only with a fungoid capsule with no destruction of the cartilage. Tuberculosis of the ankle is treated by early operation. In 32 cases treated conservatively, 14 successes and 18 failures occurred, and the latter were operated upon later; Now he restricts iodoform injections in the ankle to: 1. Fresh cases without fistulas with youthful age and good bodily condition; 2. Cases where only one joint is diseased and tendon sheaths free; 3. Cases without extensive bony destruction and production; 4. Cases in old age, in whom amputation would be the only other refuge.—*Deutsche Medicinische Wochenschrift*, Nov. 23, 30, 1905, pp. 1878–1926.

# ABSTRACTS OF CURRENT LITERATURE

## DEPARTMENT OF GYNECOLOGY

UNDER THE CHARGE OF

J. CLARENCE WEBSTER, M. D. — E. C. DUDLEY, M. D.
JOHN C. HOLLISTER, M. D. — F. W. LYNCH, M. D.

A CONTRIBUTION TO OUR KNOWLEDGE OF CHORIOEPITHELIOMA OF THE TUBE. By W. Risel.

The author reports a most interesting case of a woman of 35 years, in which apparently a chorioepithelioma followed a tubal abortion.

The woman had borne three children without complications in labor or puerperia. Age of the youngest child, 5 years. Three months before admission, she began to complain of metrorrhagia, which apparently was initiated with the expulsion of a small caseous tumor mass. Some weeks thereafter, sharp abdominal pains confined her to bed, for the relief of which she sought treatment at the hospital.

On admission, a tumor mass was found on the left side, which was considered as either an ovarian cyst or pyosalpinx. Zweifel operated, and removed a bloody tumor of the left tube, which measured 9 x 6 x 5 cm., and appeared "like placental tissue." Examination showed the tumor to be a chorioepithelioma, which Glockner adjudged to be primary in the tube.

For six weeks following operation the patient did fairly well. Shortly, symptoms of intestinal obstruction developed. The patient became jaundiced, and lost weight and strength. Entering another hospital in Leipzig, a tumor mass was found in the true pelvis. Ten weeks after the first operation, a second one was performed and a large inoperable, bloody, and œdematous tumor was observed upon the mesenteric attachment of the sigmoid flexure. Following operation the jaundice deepened, the patient failed rapidly, and died 15 weeks after the first operation, and seven months after the advent of symptoms.

Autopsy disclosed an enormous chorioepithelioma lying between the uterus and rectum, and extending beneath the peritoneum above the true pelvis, without perforating the vagina or rectum. "The genitalia, especially the uterus, were free from the growth." The uterine endometrium contained decidual cells. Numerous metastases were found in the liver and both lungs. As in the case of the primary tumor, both syncitium and Langhans' cells were noted.

Risel calls attention to Vaszmer's error, who, in 1903, stated that but one similiar case had been reported. Reviewing the literature, he finds seven at that time, and at the time of writing, eleven such cases in the literature. These he reviews. They form about 3.5 per cent of approximately 300 cases of chorioepithelioma which have thus far been reported. The author considers that the condition is as common as we should expect, if we bear in mind that extrauterine pregnancies form but a small proportion of all pregnancies.— *Zeitschrift für Geburtshülje und Gynäkologie*, band lvi, heft 1, 1905. F. W. LYNCH.

EPITHELIOMA OF THE VULVA. By Howard Dittrick.

The author has collected 135 cases from the literature, which he analyzes, together with the histories of 6 cases which he reports from the service of the Lakeside Hospital. He quotes statistics to show that this affection is comparatively rare. In 2,134 gynecological patients admitted to the Lakeside Hospital, there were 106 cases of carcinomata of the generative organs, of which 6 were primary in the vulva. Gürlt collected 7,479 cases of carcinoma in women, of which 81 were in the vulva. Billroth, in eight years, met with 4 cases in 548 carcinomata.

The disease is most frequently noted in women of advanced years. Dittrick, however, alludes to one case which was observed in a woman of twenty years. In 126 cases collected from the literature, he finds that 16 per cent occurred before the forty-fifth year, and but 3 per cent before the thirtieth year. No striking points were noted in a search for the etiology.

Pruritus was the first symptom in a majority of 44 cases. It may be noted long before the appearance of a definite neoplasm. Maurel describes a "pretumoral" period which is accompanied by a severe and intolerable pruritus. Pain generally occurs fairly late in the disease.

The growth may first appear upon any of the structures comprising the vulva, and in the collected cases was noted in the following order:

| | |
|---|---|
| Labuim majus | 52 cases. |
| Clitoris | 35 cases. |
| Labium minus | 21 cases. |
| Anterior commissure | 3 cases. |
| Posterior commissure | 3 cases. |
| Vestibule | 1 case. |

In 53 cases the disease began on the right, and in 31 on the left side. The disease most frequently attacks the labium majus on the inner surface of its posterior half, or in the sulcus between the two labia.

The disease may be first observed as an induration, a small warty tumor, or even as a small ulcer. Later, there may be a considerable tumor, which may be infiltrating or vegetating. Metastases are not infrequently found in the neighboring areas of the vulva. They may occur on the perineum. More commonly, however, they involve the inguinal glands, through which they make communication with the iliac, sacral, and lumbar groups. Cases have also been noted in which the extension was by means of the blood-vessels, with resulting carcinosis of various viscera and organs. Metastasis seems to occur early, 50 per cent of the palpable glands being described during the second six months of the tumor's known existence. As in uterine cancer, there may be considerable local growth in rare instances, without recognizable metastasis. As a general rule, all the tumors are of slow growth, at least in the initial stages.

The question of treatment is complicated to some extent by the advanced age of the patient. It would appear that the ultimate prognosis is hopeless with our present methods, inasmuch as there is no known case that has survived operation as long as six years, without recurrence. Ruprecht advises extensive dissection of all glands. He carries the incision from the symphisis to the anterior superior spine, and makes a second incision downward along the course of the femoral vessels, and removes the entire three-cornered mass of fat and glands, cutting Poupart's ligament when necessary to remove glands from the sheath of the vessels. Many hold that the condition is inoperable when the inguinal glands are enlarged.

Dittrick reports 6 cases, the ages ranging from 32 to 81 years. All were operated, and without exception soon presented local recurrence or metastases. The X-rays were used in treatment of the secondary growth in two cases. The superficial growth decreased in size under this treatment without checking the deeper extensions. Nor did it relieve the pain, save in the early stages of the second case in which this method of treatment was persisted in for nearly six months. — *American Journal of the Medical Sciences*, Aug., 1905.

F. W. Lynch.

A Case of Cystoma Ovarii Multilocular Pseudomucinosum, Perforating the Bladder and Rectum (by Pressure Atrophy) and Creating Fistulous Openings into the Ileum and Sigmoid Flexure. By Henry Martin.

The case is reported from Kaufmann's laboratory in Basel. The patient was a woman of 60 years, who for two years had been complaining of urinary disturbances and frequent diarrhœa. Gradually had there been noted an increase of the bladder trouble, for the relief of which she entered the hospital. Goiter, cystitis, uterine myoma, pelvic peritonitis, and a tumor of the right ovary (possibly malignant) were diagnosed upon admission. The case was not operated, and was treated for the cystitis by local irrigation. The woman was under observation for seven months, during which time she ran a temperature, voided most frequently, and gradually lost weight and strength. Cystoscopic examination was negative for tumor of the bladder. Bacilli coli communis and staphylococci were isolated from cultures from the bladder. Ten weeks before death, a discharge of pus was noted in the vagina. Shortly previous to this, the rectum had been felt to be infiltrated and surmounted by a fluctuating tumor. The clinical diagnosis was uterine myoma; pelvic abscess with perforation of the intestine and bladder; cystitis. An autopsy disclosed a multilocular ovarian cyst, which had perforated the urinary bladder, rectum, sigmoid flexure, and ileum; rectovesicular fistula; bilateral pyelonephritis; myoma; tuberculosis of the retroperitoneal lymph-glands.

In a review of the literature the author finds the frequency of perforations caused by ovarian tumors noted as follows:

| | Nepveu | Aronson | Düffner |
|---|---|---|---|
| Perforation into peritoneal cavity | 128 | 181 | 211 |
| Perforation into intestines | 11 | 29 | 51 |
| Perforation into bladder | 6 | 12 | 26 |
| Perforation into uterus | 1 | .. | .. |
| Perforation into vagina | 2 | 17 | 33 |
| Perforation through abdominal wall | 7 | 18 | 34 |

Certain observers, as Wülle, Schmit, and Bäcker, believe that perforation of the bladder is more apt to follow the pressure of dermoid cysts, especially

those containing teeth and bone.— *Monatsschrift für Geburtshülfe und Gynäkologie*, band xxii, heft 6, Dec., 1905. F. W. LYNCH.

A NEW OPERATIVE PROCEDURE FOR THE CURE OF COMPLETE PROLAPSUS UTERI AT THE MENOPAUSE. By Theodore Landau.

The author is deeply interested in the operations which aim to cure prolapse by utilizing the uterus as plastic material. Since the appearance of Wertheim's operation he has preferred this to the earlier Freund method, inasmuch as it preserves the integrity of the vaginal canal. Although the results of the Freund, Fritsch, and Wertheim operations are generally satisfactory, in certain instances in which the uterus is large and heavy the ' bearing down " and dragging sensations may return after operation, as was twice noted. He proposes, therefore, what he terms a new operation, of which the essential feature is the creation of a new pelvic floor, by utilizing portions of the uterine musculature, and by the obliteration of the cul-de-sac of Douglas, accomplished by stitching the posterior peritoneum of the cul-de-sac to the upper portion of the anterior vaginal wall. He states that in the operation is not technically difficult, and is performed as follows: After disinfection, the anterior vaginal wall is made tense, and is incised from a point immediately below the urethal orifice to within 2–3 cm. of the external os. After extending the incision around the anterior lip of the cervix, the vaginal walls are detached and the bladder pushed back. The plica vesicouterina is now opened, and the fundus is brought forward so as to bring the peritoneum of the posterior wall of the cul-de-sac within easy reach. This latter is now caught with one or two silkworm-gut sutures (the bite of the needle also including the uterine muscle), and is fixed to the upper angle of the vaginal incision. By sharply anteflexing the uterus the organ is brought without the peritoneal cavity. The adnexa are now removed, and, cutting from before backwards, the greater portion of the uterus is resected, together with the upper portion of the posterior vaginal wall. The anterior vaginal incision is now closed, the sutures including the remains of the uterus. A high posterior colporrhaphy by any method which shortens the fibers of the levator ani and thus makes a new rectovaginal septum, completes the operation. — *Zentralblatt für Gynäkologie*, No. 43, Oct. 28, 1905.

F. W. LYNCH.

# ABSTRACTS OF CURRENT LITERATURE

## DEPARTMENT OF OBSTETRICS

UNDER THE CHARGE OF

C. S. BACON, M. D. RUDOLPH W. HOLMES, M. D.

C. v. BACHELLÉ, M. D.

CONGENITAL FŒTAL CYSTS OF THE NECK, OBSTRUCTING LABOR. By F. J. Tausig.

In the case reported by Tausig, a high forceps application was necessary to deliver the 9¾ pounds child, which, though otherwise normal, had in the region of the left sternomastoid a fluctuating tumor the size of a man's fist. It extended from the clavicle to the mastoid, and from the ligamentum nuchæ to the great vessels in front. Apparently, it lay directly beneath the skin, which, however, was movable over the tumor. When the child was eight months old the tumor was removed. It was found to be multilocular, its coat intimately connected with the cervical fasciæ, and firmly adherent to the clavicle. The patient made a good recovery from the operation, and no post-operative paralysis occurred, but some months later the child developed tubercular enteritis, and still later died of general tuberculosis. The microscopical examination showed the tumor to be a typical lymphangioma.

Fœtal cysts of the neck may be of several varieties:

1. The cyst may be of the nature of a spina bifida in the cervical vertebræ, occipital meningocele.

2. Branchial cysts.

3. True blood-cysts, of uncertain origin, are occasionally found.

4. Cystic enlargement of the thyroid.

5. Congenital lymphangioma, most frequent of any of these varieties, though statistics show it to occur in only 1 of 327 cases of antenatal pathology. These are often deep-seated, but when superficial may have diverticula passing down among the deep vessels and other structures. The cavities are lined with an endothelium like that of a lymphatic vessel. The contents usually consist of clear serum, though occasionally it is brownish, as a result of hemorrhage into the cyst.

As to etiology, he believes von Winckel's theory, that traction by amniotic bands and stasis in the muscular tissue lying at the base of these tumors, is corroborated by the bulk of evidence thus far produced.

Antepartum diagnosis of these tumors is usually impossible. In a majority of cases, the size is not sufficient to more than retard labor. When they are in the posterior triangle, they seem to cause more difficulty in the delivery of the child, for, of 18 such cases, more were born alive, whereas in 60 cases where they were situated anteriorly, 56 were saved. The consistency of the tumor, too, would influence the difficulty of delivery.

Careful forceps application may be done where spontaneous delivery seems impossible, or manual extraction in breech cases. Occasionally the cyst can be rotated so as to lie in the hollow of the sacrum. Sometimes it ruptures during extraction, and sometimes, though rarely, puncture of the cyst may be justifiable.

After birth, delay in extirpation is advisable, because spontaneous cures have been reported. When operation is done, it is not absolutely necessary to remove all the adherent portions of the cyst-wall, for there is little danger of recurrence. On the other hand, the cyst-wall may be sewed to the skn, the septa between the various portions of the cyst broken down, and the whole drained.—*American Jour. of Obstet.*, Dec., 1905.

SIMULTANEOUS EXTRA AND INTRA UTERINE PREGNANCY. By F. v. Neugebauer.

Neugebauer reports two such cases, the first of which died of shock, due to hemorrhage following rupture of the pregnant right tube. The second case had a tubal abortion, following abortion of the uterine egg, and, after operation, recovered.

The left ovary of the first case showed two corpora lutea, and since it can scarcely be supposed that the ovum passed through the left tube, uterine cavity, and into the right tube, it is probable, and indeed almost certain, that there was an external migration of the egg from the left ovary into the right tube. Both tubes were healthy, and free from all deformities or inflammatory changes. The ovum had passed three fourths of the way

through the tube, and evidently could not pass, because of the swelling of the mucous membrane caused by the uterine pregnancy. Another peculiarity of this case was, that the sizes of the ova indicated that they were of different ages; the intrauterine egg being about from eight to ten weeks, while the extrauterine one was about seventeen days of age. He states, however, that it is possible that the conceptions were synchronous, and that the extrauterine egg, for some reason or other, fell behind in development, or that perhaps superfetation took place. The third peculiar feature was, that, aside from the old ectropion of the cervix, there was absolutely no history or indication of any disease or malposition of the genital organs. One corpus luteum was about half as large as the other, which would seem rather to indicate that the conceptions occurred at an interval. It is also remarkable that there should have been such a severe and fatal hemorrhage from so small a tear, though that may be explained by the existence of an unusual hyperæmia, due to the presence of the uterine pregnancy; or perhaps by the site of the tear, it being near the uterus; or by the faulty therapy used, viz., hot applications to the abdomen. Another interesting point, confirming the observation of Mainzer and others, was the occurrence of prodromal symptoms of rupture, the severe pressure on the bladder and desire for micturition.—*Zentralblatt f. Gynäk.*, No. 46, 1905.

HISTOLOGY OF THE BREUS SUBCHORIAL HEMATOMA. By Frankl.

The patient from whom this specimen came had aborted twice before. In this instance the menses had not appeared for two months, when she noticed a slight flow. Five months later the abnormally small egg was expelled from the uterus. The amniotic surface showed many humps and tuberosities projecting from it. These were of various sizes, and of a bluish color because of the collection of blood beneath the membrane. The largest of these was about the size of a pea. From the center of the lumpy portion the umbilical cord arose, and led to a very much flattened and compressed fœtus.

The value of the specimen being that it shows the earliest stages of the mole formation, and because the protuberances are still very small, it easily permits demonstration that they develop in the intervillous spaces. The amnion was thrown into folds, its size indicating that it had continued to grow more than the chorion, after the death of the fœtus. The chorion also showed a tendency to fold as described by Breus, and these, becoming dilated, appear as empty intervillous spaces. In these he was able to demonstrate newly formed blood-vessels filled with fluid blood, which form the above-mentioned protuberances. True hematomas result from the spreading of the blood foci and the degeneration or absorption of the villi.—*Beiträge zur Geb. und Gynäk.*, ix, No. 3.

THE EXTRACTION OF THE HEAD AFTER DECAPITATION. By Dr. Rühl.

Rühl deprecates the method advised by Bensinger, in which the head is seized with toothed forceps and removed by steady traction continued for hours, or even days, for he believes that the chances for infection, sepsis, or hemorrhage are too great if this method is used. If systematic and proper measures are taken, the head may be promptly removed without great difficulty. Several cases are cited to show the results obtained by Rühl's methods. As soon as the body of the fœtus is removed, he places two fingers in the mouth and makes traction on the lower jaw, while the external hand makes strong pressure above to prevent the head from slipping back. During the procedure it is extremely important to bear in mind the normal mechanism of the passage of the head through the pelvis, and to cause the head to descend accordingly. It is not advisable to try to apply the forceps to the head above the inlet of the pelvis, for they will generally slip off, but once the head has entered the cavity, there can be no objection to doing so. Should this method fail, the head should be perforated, and in order to do so, it should be firmly and immovably fixed by being held by an assistant against the pelvic inlet. Then the cranioclast can be entered through the mouth, through either of the fontanels, or perhaps through the orbit. After perforation, the extraction should be done with the cranioclast, and the operator must adapt his method to the necessities of the case. In case some hours have elapsed since the extraction of the fœtal body and the cervix has contracted, it should be dilated with the Bossi dilator. This may be easily done, for the amount of dilatation necessary to deliver the perforated head is only 3 to 4 fingerbreadths. For cases where extreme contraction of the pelvis exists, the vaginal Cæsarean section must be done. —*Zentralblatt f. Gynäk.*, No 46, 1905.

THE MANAGEMENT OF PLACENTA PRÆVIA. By Heinrich Fritsch.

Fritsch declares that he considers placenta prævia centralis the most severe of obstetrical emergencies. In almost all other obstetrical emergencies there are definite precedures to be carried out, but in placenta prævia centralis it is often

a serious question whether to interfere or to abstain. We have not yet arrived at that stage where, upon making certain the diagnosis of placenta prævia, we may immediately perform vaginal Cæsarean section, with its appreciable dangers in place of the old therapy with lesser dangers. Neither can we follow the old maxim to induce abortion or labor immediately the diagnosis is established in order to save the mother from the evil results of repeated severe hemorrhages, if we consider the life of the child; for it is not absolutely certain that the first hemorrhage will be followed by others.

Three questions present themselves to the obstetrician:

1. What shall be done for the bleeding during pregnancy?

2. What is to be done when labor has apparently begun, but the cervix is still too narrow and hard to permit of interference?

3. What shall be done in a case where the labor is unquestionably under way and the cervix is dilating, and a dangerous hemorrhage sets in?

Hemorrhages of no inconsiderable degree occur frequently during pregnancy. If the bleeding is severe, it indicates that a portion of the placenta, though a small one, must have become separated; otherwise it must be due to carcinoma of the cervix or a ruptured varix of the vaginal wall, both of which are easily diagnosed by vaginal examination. He has frequently seen cases where, without trauma of any sort, there has been a sudden copious gush of blood from the vagina while the patient was sitting quietly. This ceases, upon rest in bed, by coagulation and lessened blood-pressure due to the severe loss of blood. Such hemorrhage can, of course, last only a very short time, and does not necessarily recur at the time of labor. These, usually, are caused by a placenta prævia marginalis, as is shown by examination of the placenta after delivery.

The fact that after such a severe bleeding a normal labor with normal child may occur without hemorrhage, in itself speaks against the dictum of inducing abortion or labor after the first hemorrhage. Rest in bed, careful competent supervision, preparation for the immediate tamponade in case of recurrence, abstinence from work, coitus, and walking will be the proper course to pursue.

One must also differentiate between new and old blood, for if dark fluid blood mixed with small thin black coagula pass for several days after the initial hemorrhage, the blood comes from the uterus. This was retained between the uterus, membranes, and placenta. Such bleeding is of no significance. Quite different is the meaning if a continuous flow of bright red fluid blood persist, or if fresh red coagula form in the vagina and are expelled from time to time, for, under such circumstances, the hemorrhage is progressing, and soon the pulse will show the effects, and usually uterine contraction begin, the cervix softens and may dilate sufficiently to allow the index finger to enter and palpate the placental tissue. In other cases this condition does not continue, and the cervix closes again, the hemorrhage ceases, and labor occurs four to six weeks later, at the proper time, without renewed bleeding.

If, however, at intervals of several hours or a few days, repeated and severe hemorrhages occur, the condition becomes dangerous to life, and the vaginal tamponade should be done, unless conditions are favorable and skilled assistance at hand, when immediate vaginal celiotomy should be the precedure. In case the tamponade is made, certain rules and precautions should be observed. First, asepsis must be absolute, the vulva and anal region must be thoroughly disinfected, and then from time to time they should be again rinsed with a strong lysol solution, for the vulva cannot be as thoroughly sterilized as the hand, so that it will remain so for even many minutes. This will make it pretty certain that practically no contamination will be carried in with the tampon material, which should be moist, but well rung out, and which should be taken from a sterilized vessel held closely against the vulva. Loose, dry gauze makes a very inefficient tampon. Secondly, the patient, with bladder and rectum empty, should be in the Sims position, for then the uterus tilts forward, and by strongly retracting the perineum, the vagina balloons and makes it possible to pack the whole pelvic space easily and painlessly and thoroughly. The tamponade should be made with the finger, and not with an instrument, and should be done very gently, for the puerperal vaginal walls are very soft and friable. Because of this, instruments have injured them frequently, and particularly when a nervous or restless patient throws herself about. Such accidents are avoided when the finger alone is used.

When the vagina is filled with the tampon, the patient is placed on her back, with the thighs pressed closely together. Then the uterus sinks down, the fœtal head rests on the tampon, and thus compresses the bleeding spot. An abdominal binder aids in maintaining this pressure. Such a tampon is efficient, and usually produces sufficient irritation to the lower uterine segment to induce labor. The pulse and the contractions should then be watched, and the uterus stimulated, if necessary, by massage with the finger tips. If,

after a time, the tampon is expelled, the cervix will be found dilated sufficiently to permit either of spontaneous delivery or of the necessary manipulation.

If the child should be dead, it is perforated and extracted after pressing the head into the pelvic cavity by the Hofmeier method. If it is certain that the child is not viable, it should be perforated, in the interests of the mother. Extraction in all of these cases should be made very slowly and with greatest care because of the liability to severe cervical tears.

If the placenta covers the whole cervical opening, the hand should tear through the placental tissue and endeavor to reach the head while the external hand presses it down into the pelvis.

The worst cases are those in which a dangerous hemorrhage occurs, the cervical canal being still very narrow and the child alive. Here, if the placenta is marginal, the membranes should be ruptured and the head pressed into the pelvis, when, frequently, the hemorrhage will stop and the labor rapidly ensue. If, however, it should be a placenta prævia centralis with internal os almost obliterated though the external os is narrow, the hemorrhage will be severe, and quick action is necessary. Version and extraction should be done. In such cases the child is usually lost, because of the large area of placenta separated from the uterus, or it is born in a condition of asphyxia pallida. The mother, however, is usually out of danger as soon as the uterus is emptied.

In cases where the above-mentioned conditions prevail, with the exception that the internal os is still narrow and hard, hemorrhage may have to be controlled by operative interference. If the dilatation is made by hand, severe tears will occur, and therefore Fritsch recommends the use of the hard metreurynter of Ribémonds, until enough dilatation is obtained to enter with the hand. He advises against the use of the Bossi dilator for this purpose, because dilatation by the hand is safer.

The placenta in these cases is easily removed, often following directly after the child.—*Deutsche Med. Wochenschr.*, No. 47, 1905.

### The Germ-content of the Uterus and Vagina during the Normal Puerperium. By James Brownlee, Stockton-on-Tees.

After reviewing in detail the literature on the bacteriology of the female genital tract, going as far back as Gönner in 1887, Brownlee gives the results of his own investigations. His series of cases consisted of 20 normal puerperal women, the specimens having been obtained on days varying from the second to the twelfth. The result of the examinations was, that "although no single specimen gave negative results throughout, yet the 37 uterine specimens showed only 3, in two patients, in which a pathogenic organism—viz., the gonococcus—was present, and the 42 vaginal specimens only 5 in which such organisms occurred,—viz., gonococcus twice, bacillus coli communis and staphylococcus pyogenes aureus once (the last being almost certainly a contamination)."

From this he concludes "that the lochia of normal puerperal women only exceptionally contain organisms capable of giving rise to puerperal septicemia. That they do not contain organisms which may on occasion give rise to slight fever, I am not prepared to say."

In attempting to reconcile the many contrary statements as published by the various investigators, Brownlee calls attention to — 1. The differences of technic; 2. The times at which the specimens were obtained; 3. The amount of secretion used for examination, etc. He regards the question of technic as most important, and describes his own. A glass tube of about 5 mm. diameter, attached to an aspirating syringe, comprised his apparatus, and he found that by having an assistant hold the labia well apart he could introduce the tube without chance of contamination from the vulva or hymen. He was thus enabled to dispense with the speculum, an instrument which, he believes, is responsible for the positive results of so many observers.

Five distinct forms of organisms were distinguished in Brownlee's series of vaginal specimens. These, including yeast, were all different from the ordinary pyogenic types. While admitting, with Döderlein, that it is possible to distinguish two distinct types of secretion, he agrees also with Krönig in saying that it is of no importance to do so. The organisms found were these:

A. *In the uterine and vaginal specimens.*

1. A bacillus of somewhat variable size, which, in process of development, took on spore formation and showed a great variety of what were apparently involution forms; e. g., beading, clubbing, bipolar staining, and formation of filaments of various lengths, never, however, branching. It resembled, in many ways, bacillus subtilis, but grew both aërobically and anaërobically, and was larger and coarser. It stained by Gram.

2. A short bacillus, generally in pairs, often showing distinct metachromasis; grew in bouillon only, and appeared in one case to be in pure culture.

3. A large coccus, occurring sometimes in pairs, at other times in groups like staphylococci. It appeared in two or three cases in pure culture, and

had not the appearance of any of the pyogenic organisms.

4. A small coccus, occurring singly, in pairs, or groups, generally along with 1, often showed metachromasis.

5. A diplococcus having the morphological characters and staining reactions of the gonococcus.

B. *In the vaginal specimens only.*

6. A coccus having the characters in film and culture of staphylococcus pyogenes aureus. Almost certainly a contamination. It occurred once only.

7. A bacillus staining uniformly, and both in microscopic and macroscopic appearances resembling closely bacillus coli communis, occurred in the same patient on two different occasions. She had no clinical disturbance.

8. Forms of yeast fungi appeared in two specimens.

In collecting specimens of lochia the author used practically the technic of Döderlein, as well as the same culture media, but his results were very far from coinciding with those of that investigator. He considered, however, a slight colony a positive result, whereas Döderlein, like many other observers, fixed a considerably higher limit in this respect.

The question of real importance is, not so much whether or not the uterine cavity is absolutely sterile in the normal puerperium, but, does it contain pyogenic cocci of any sort which could produce puerperal septicemia? Brownlee has noticed that in most cases the growths on the culture media were much more profuse in the vaginal than in the uterine specimens. While there is a relatively larger number of bacteria present in the vagina, yet often it was quite evident from the direct films that there was as great bacterial density in the one as in the other, notwithstanding the results were as stated. This recalls Krönig's suggestion of some antibacterial power in the normal puerperal endometrium.

From his small number of cases the author does not attempt to draw positive conclusions as to the effect of duration of labor, its various stages, the number of the labor, etc. The other investigators agree only on one point; viz., that retention of fragments of secundins encourages the growth of bacteria in the uterus.

Brownlee's conclusions from his study of the literature and from his own observations are as follows:

1. We may look on the genital passages of the female as normally free from pyogenic cocci, which can cause puerperal septicemia.

2. The same cannot be said as regards organisms both aërobic and anaërobic, which, while not actually pyogenic, may yet be capable of causing the slighter fevers of the puerperium.

3. Gonococci may be found in the puerperal uterus, even in cases running an apparently normal course.

4. Antiseptic douching before, during, or after labor is to be considered in all ordinary cases not only unnecessary but actually dangerous, since it has been amply proved that the normal secretions of the genital passages have distinct bactericidal powers, and if we remove those secretions by douching, we lower the powers of resistance of these parts, and thus increase the danger of infecting them by accidental contamination in the process of douching.

Finally, from five other cases which developed febrile temperatures during the puerperium, and of which pyogenic organisms (gonococci) were discovered but in one case, Brownlee decides that feverish symptoms postpartum are by no means always due to ordinary pyogenic bacteria. He therefore agrees with Marx in strongly emphasizing the necessity for considering every puerperal case with a disturbance of temperature from a general as well as a local standpoint.—*Jour. of Obst. and Gyn. of the Brit. Emp.*, Sept., 1905.

### Cæsarean Section for Ankylosis of Both Hip-joints, Following Tubercular Coxitis, Complicated by Mitral Insufficiency and Postpartum Eclampsia. By Rudolph W. Holmes, M. D., Attending Obstetrician, Cook County Hospital.

Patient. — Mrs. L., admitted to the County Hospital, April 27, 1905. Primipara, 23 years old; married a year previously. At six years of age had a left tubercular coxitis; shortly thereafter the right hip became involved. Suppuration in both joints continued until her fourteenth year. Since then there has been no disturbance of an inflammatory nature. Aside from the difficulty of locomotion, she has had but one other complaint, shortness of breath, which developed gradually after the suppurative process subsided. She gives no history of rheumatism. The dyspnœa became aggravated in the second half of pregnancy. Since the seventh month there has been some œdema of the feet. Entrance in marital relations was obtained from the back.

*Examination.* — Patient was four feet ten inches tall, and weighed one hundred pounds. Heart was enlarged; a loud, systolic, mitral murmur was heard at the apex, transmitted to the left. The pulse was 90–100. Uterus had reached the ensiform,— in fact the fundus was deeply buried under the left costal arch. The child was esti-

mated to weigh 6½–7, pounds, but, unfortunately, this weight was not corroborated after the operation. The fœtal position was L.O.A., head high, and freely movable. The knees were found in close apposition, the maximum of abduction being about a half-inch; flexion of the thighs was practically impossible: a pseudo-flexion was produced by the mobility of the pelvis about the lumbar vertebra. On standing, the pelvis was noted to have an increased inclination, due to the backward displacement of the eroded, ankylosed hips. The external measurements were: Spines, 22; crests, 22; trochanters, 26; Baudelocque, 18. The right leg was one inch shorter than the left.

It was impossible to measure accurately the diagonal conjugate, as the examining hand could not be brought in apposition with the subpubic ligament. From the ease with which the promontory was palpable, the diagonal was estimated to be between 10 and 11 cm.; therefore the vere was between 8 and 9 cm.

Her last menstruation was August 20, 1904; labor was due May 27, 1905. The operation was planned to be an elective one, and May 20th was the time set for the section, for it was essential that the operation should be carried out before labor began, as there was danger of the head entering the brim: this might seriously interfere with the extraction of the head. She was examined on May 3d, about 10 A. M. At four o'clock that afternoon labor started. Although the patient promised faithfully to inform the nurse the moment the pains started, she neglected to do so. As a result, nearly four hours elapsed before the preparation of the operation was completed. During this entire time she had strong expulsive pains.

The operation consumed about fifty minutes. The uterus was delivered through the abdominal wound. The uterine incision was made through the anterior wall, where the placenta was situated. The placenta came away at once, with no abnormal hemorrhage. The strong contractions had unfortunately fixed the head in the brim, so there was difficulty in delivering it, losing valuable time. The child was delivered dead. The method used to free the head was a "Mauriceau" reversed.

The usual post-operative course was noted. The only events to arouse anxiety were the two eclamptic convulsions, which occurred on the 5th, one at 4 A. M., the other at 8:30. The day before the operation the twenty-four-hour amount of urine was 350 c.c., containing 5 per cent, by volume, of albumin, and urea 3 per cent, and having a specific gravity of 1025.

The fact that the head had become fixed in the brim corroborated our suspicions that the pelvic contraction was not necessarily of such a degree as to warrant the section. The indication was rendered absolute by the impossibility of performing any manipulation through the vagina. From a cursory review of the literature, double ankylosis of the hips, due to tubercular arthritis, is rare as an obstetric complication. That she had a post-operative eclampsia adds an interest to the happy outcome. Again I would repeat that it appears to the reporter of this case that the oft-reiterated statement of the dangers and technical difficulties met with in placenta prævia Cæsarea are more theoretical than real. The writer has had two cases so complicated, and has observed some six or eight others, operated by various men, and in none was there any more hemorrhage than is usually met with when the placenta is not in the line of incision.— *American Jour. of Obstet.*, vol. lii, Dec., 1905.

# REVIEWS

THE AMERICAN JOURNAL OF UROLOGY. Edited by Charles Greene Cumston, M.D., Boston, and published under the auspices of the American Urological Association with the active collaboration of a large number of prominent urologists at home and abroad. Grafton Press, New York. $3 a year, in advance.

The journal claims to be the only publication in the English language devoted to urology, and in the quality of its articles can be ranked second to none of the first-class medical periodicals here and abroad. Among the papers soon to be published in the present volume may be mentioned: Catarrhal Nephritis, by Dr. I. N. Danforth, Chicago; The Surgical Treatment of Medical Nephritis, by Reginald Harrison, F. R. C. S.; Hysterical Anuria, by Drs. Edgar Garceau and J. W. Courtney of Boston; Tuberculosis of the Prostate, by Prof. Tedenat of Montpellier, France; Gonorrhœal Infection of the Urethral Follicles and Diverticula, by Dr. Couderc of Montpellier, France; Analysis of the Urine, by Dr. J. Bergen-Ogden of New York; Neoplasms of the Bladder, with particular reference to Sarcoma, by Dr. Moritz Loewenheim of the University of Würzburg, Germany; The Differential Diagnosis of Large Neoplasms in the Left Hypochrondrium, by Dr. Gauffer of Lyons, France; Prostatectomy, by Dr. Follen Cabot of New York; Renal Hematuria, by Dr. David Newman of Glasgow, Scotland; A Study on Cryptogenic Suppurating Pyelonephritis, by Dr. Eduard Pieper of Munich; Renal Disease during Pregnancy, Labor, and the Postpartum, by Dr. Fritz Bauman of Munich; Spontaneus Rupture of the Bladder following Cystitis, by Dr. Karl Schaumann, Munich; On Primary Carcinoma of the Ureters, by Dr. Kurt Vorpahl of Greifswald, Germany; and many others.

The editors and publishers have arranged to have the volumes end with the calendar year, instead of in October of each year, as heretofore.

The name of the editor alone is sufficient guaranty for the literary excellence of the journal.

OPERATIVE SURGERY. For students and practitioners. By John J. McGrath, M.D., professor of surgical anatomy and operative surgery at the New York Post-graduate Medical School; Surgeon to the Harlem, Post-graduate, and Columbus hospitals, New York. Second edition, thoroughly revised. With 265 illustrations, including many full-page plates in colors and half-tone. 628 royal octavo pages, extra cloth, $4.50, net; half-morocco, $5.50, net. Sold only by subscription. Philadelphia: F. A. Davis Company.

This excellent work, which has reached its second edition, appears in new form, and the matter has been brought up to date. The revision of the book is especially shown in the portion dealing with operations on the stomach and intestines.

The work is essentially one on technique, and does not purport to consider extensively diagnosis, pathology, or historical delineation. It is a work which should appeal alike to surgeons and medical students. Many instructive illustrations and much new and interesting descriptive matter have been added to the new edition.

In the section upon the abdomen, the subjects of gastroenterostomy and the surgical treatment of diseases of the stomach and intestines have been treated in minute detail. The operative surgery of the pancreas, spleen, etc., has also been described at length. Recent advances in the surgery of the prostate gland have received due consideration in the revision of the section upon the urinary organs.

The book is well gotten up from the standpoint of the publisher, and is a publication which should continue to reap the benefit of a creditable authorship.

ADDRESSES AND OTHER PAPERS. Edited by William W. Keen, M.D., LL.D., F.R.C.S. (Hon.), Philadelphia. Philadelphia and London: W. B. Saunders & Co.

This admirable work consists of a collection of twenty-five addresses delivered by the author at various times and places, and before vastly different audiences. Collectively, they show the author's broad knowledge of subjects intimately connected with medicine and surgery. In the author's inimitable style he has defended and justified the practice of vivisection, and points out numberless illustrations of the benefits it has wrought for both man and the lower animals.

In several of this collection of addresses he makes strong pleas for better preliminary training for a medical career, and argues again and again for a higher medical education as an equipment for one's work in the profession.

In reading these addresses, one cannot but be impressed with the rapid advance that has been made in all departments of medicine since the author first became a teacher. In these addresses he has repeatedly advocated the quiz class and the quiz-master as a method of teaching, but deplores the passing of the didactic lecture, because of the loss of the personal influence of the lecturer. In his address, "The Ideal Physician," he sets forth his idea of the characteristics and qualifications that one should possess to fulfill the many requirements that are imposed upon him during his medical career.

These addresses, as a whole, are most pleasurable and profitable reading, and should prove useful to the profession and the public.

TEXT-BOOK OF OBSTETRICS. By J. Clifton Edgar, M. D. Philadelphia: Blakiston & Co. 1904.

One cannot but note a feeling of pride in the fact that many of the best medical works of the world are now produced by Americans, and one of the best examples of this fact is *Edgar's Text-book of Obstetrics*, which now appears in its second edition with 1150 pages.

It is rare to find a medical book wherein such a high level of scientific thought is maintained in combination with fine practical methods and excellent literary qualities.

The review of such a work can only consist in a partial enumeration of the most striking of the many prominent and successful features which distinguish this book from others

The most apparent and not the least attractive feature is the large number and the great excellence of the illustrations, all of which have been thoughtfully chosen and well executed.

The great value of pictorial teaching, especially in obstetrics, cannot be overestimated, and the author has emphasized this value by the addition of nearly fifty new plates to the already large number in the first edition.

The chapters on pelvic measurments, placenta prævia, accidental hemorrhage, and the physiology and mechanism of labor are well written, conservative, and abundantly illustrated.

The subject of monstrosities is covered very thoroughly, and the chapter on antenatal pathology is amply sufficient for all practical purposes, and obviates entirely the necessity for such special works as Ballentyne's, except for those who are particularly interested in that department. The *résumé* in Edgar takes us briefly to the limits of the present definite knowledge of the subject.

The use of gloves and the importance of asepsis in the examinations in pregnancy as well as in labor, and the danger of infection to low-lying placentas through such examinations, are very properly emphasized.

Due stress is also laid upon the great importance of non-interference in normal labor without definite indications.

It is not commonly recognized that the ability to inhibit activity under certain conditions demands a higher order of cerebral development than the ability to perform: the will to refrain is higher than the will to act. The frequent reference in literature to the dietary of Prochownick will make the appearance of this method in detail a very grateful relief to many who do not have access to the foreign publications.

The advocacy of the steel curette in place of the finger as an act of choice for cleaning out in complete and inevitable abortions will certainly fail, however, to find universal approbation. The greater information obtained by the finger and the greater danger of perforation by the steel instrument should give the first place, wherever possible, to the digital curettement.

American obstetricians have quite generally accepted the conclusions stated by Edgar, that the results obtained by active intervention in cases of inevitable abortion are far more satisfactory than those obtained by the expectant method or by the tampon and ergot, which, in reality, is only a modified expectancy.

Probably on account of its historical value, Edgar retains the term " deciduoma malignum " in place of chorioepithelioma, which is now recognized as more nearly correct from a histological standpoint.

One is somewhat surprised to note that the author still refers to the grape-like bodies in hydatidiform mole as myxomatous degenerations.

The experiments of Marchand, Pick, Van der Hoeven, and others, on account of the absence of the mucin reaction, seemed to demonstrate that these bodies were in reality a simple œdema, and this view has been quite generally accepted.

The scopolamine-morphine anæsthesia is not discussed, and probably will have but a very small place in the future of obstetrics.

One of the best and most interesting chapters in the book takes up the toxæmia of pregnancy. He very competently summarizes the present state of our knowledge, and justly gives the subject the importance which is deserves as a distinct pathologic condition. There is a vast amount of work yet to be done in this field, and as the knowledge of physiological chemistry becomes more advanced, and a more definite idea of the cellular metabolic

processes is obtained, there will be many discoveries in this fascinating but almost unknown realm.

The chapter on puerperal sepsis and morbidity takes up another extremely important subject very clearly and satisfactorily, although the success attained by Pryor's method of systemic iodinization in these cases would seem to warrant more extended attention.

As a text-book, the author's command of his subject is exhibited on every page, and from the reader's standpoint we have a well-written modern scientific and almost encyclopædic work which is a credit to the author and a source of pride and satisfaction to the profession.

MANUAL OF GYNECOLOGY. By Hart and Barbour. Sixth edition. Chicago: W. T. Keener & Co.

A book that has gone through five editions, and that has become as well known throughout the world as this one, has already proved its value.

This last edition has been brought out, according to the authors, because of recent developments in operative gynecology, and with few exceptions these are well covered.

Upon a superficial examination, one is not particularly struck either with the quality of the binding or with the quality of illustrations; but the more thoroughly one looks into the contents, the more satisfied he becomes as to the amount and quality of the written material. There is probably no other book on gynecology that has attempted, even in a most cursory way, to cover the amount of ground that this book has. This last edition is something over seven hundred pages. Examination of the table of contents gives a good idea of the enormous number of subjects touched upon. The systematic way in which the authors have covered the subject is admirable. With a few exceptions, not only the frequent "big things" in gynecology have been well covered, but the rare, odd pathological conditions, etc., have been described, and have been described in such a way as to make one think the authors have really tried to throw light upon many subjects the significance of which a student is rarely able to find explained in other text-books.

The book pretends to be merely a manual, and, strictly speaking, it is one. But it is not merely an outline; for, under each heading, enough is given to warrant the name of text-book, if not of reference-book.

One of the main things, in fact, that strikes one at the first of every chapter is a full list of references to the world's literature upon the subject included in that chapter.

The main book is divided into two parts,—one on anatomy, physiology, and method of examination of the female pelvic organs; the other on the diseases of the female pelvic organs, including peritoneum and connective tissue, affections of the Fallopian tubes and ovaries, affections of the uterus, affections of the vagina, of the vulva and pelvic floor, disturbances of the menstrual function and of the reproductive function, and affections of the bladder and rectum. No pretense is made to cover the last subjects—affections of bladder and rectum—with any fullness, and these chapters are probably the most unsatisfactory in the book.

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## CORRESPONDENCE

SURGERY, GYNECOLOGY AND OBSTETRICS:

On several previous occasions,[1] I have called attention to the use of a probe or needle for the purpose of locating subcortical brain tumors, abscesses, etc., after the brain cavity is opened, and am constrained to do so again by the belief that the method is not so widely known or used as it deserves. This belief was strengthened by reading Cushing's splendid article on "Decompression for Inaccessible Brain Tumors" in the October number of SURGERY, GYNECOLOGY AND OBSTETRICS. In the report of the case of Karl L., in the paper above referred to, the author says, that, in view of the symptoms, it seemed "probable that the lesion was a deep-seated left-sided growth in the posterior part of the hemisphere." "For these reasons an exploratory craniectomy . . . was undertaken, in the vain hope that a growth might be found. . . . Thes ituation of the growth was not determined." He further states that the post-mortem examination revealed a "large encapsulated growth, . . . whose bulk occupied in large part the entire site of the occipital lobe." It would seem that this growth might have been located by the method above referred to. A probe introduced into the brain substance over the tumor would have imparted to the hand a sense of increased resistance the instant the point reached the capsule of the tumor. In case of abscess or cyst, there is imparted to the hand, through the probe, when the wall of the cyst or abscess is reached, a sense of increased resistance, and if the probe be pushed into the cav ty, there instantly follows the sense of lack of resistance. By the means indicated I have on several occasions[2] been able to locate tumors and abscesses buried deeply in the brain substance and presenting on the surface no signs of their existence. A probe or dull needle is to be preferred to a sharp instrument, for reasons that are patent. If the probe come in contact with a blood-vessel, an increased resistance is felt, of course, but a slight shifting of the point enables the probe to pass on. One's anatomical knowledge should prevent his being misled by the probe being brought in contact with the tentorium or falx. It is hardly necessary for me to say that this is not written in a spirit of captious criticism, but simply in the hope of aiding a little in the advancement of brain surgery.

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[1] *Jour. Amer. Med. Ass'n*, Jan. 25, 1902, and May 2, 1903.

[2] Loc. cit.